This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

Harvard Dental School.

TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION

AT THE

THIRTY-SECOND ANNUAL SESSION,

HELD AT

NIAGARA FALLS, N. Y.

BOSTON MEDICAL
NOV 8 1893

COMMENCING ON THE 2d OF AUGUST, 1892.

PUBLICATION COMMITTEE:

GEO. H. CUSHING. E. T. DARBY. A. W. HARLAN.

PHILADELPHIA:
THE S. S. WHITE DENTAL MANUFACTURING CO.
1893.

DISCLAIMER.

THE AMERICAN DENTAL ASSOCIATION, although formally accepting and publishing the reports of the various Standing Committees and the essays read before the Association, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution.—*Constitution.*

CATALOGUED,

J. F. B.
11.8.1893

PRESS OF PATTERSON & WHITE,
PHILADELPHIA.

LIST OF OFFICERS FROM DATE OF ORGANIZATION.

PRELIMINARY CONVENTION, NIAGARA FALLS, AUGUST, 1859.

President,	W. W. ALLPORT . . .	Chicago, Ill.
Secretary,	J. TAFT	Cincinnati, Ohio.

ORGANIZATION AND FIRST SESSION OF ASSOCIATION, WASHINGTON, D. C., JULY, 1860.

[Annual meetings to be hereafter, last Tuesday in July.]

President,	W. H. ATKINSON . . .	Cleveland, Ohio.
1st Vice-President,	J. B. GIBBS	Washington, D. C.
2d Vice-President,	W. CAHOON	Detroit, Mich.
Recording Secretary,	J. TAFT	Cincinnati, Ohio.
Corresponding Secretary,	W. MUIR ROGERS . . .	Shelbyville, Ky.
Treasurer,	S. DILLINGHAM . . .	Philadelphia, Pa.

[NO MEETING IN 1861.]

CLEVELAND, JULY, 1862.

President,	GEO. WATT	Xenia, Ohio.
1st Vice-President,	W. H. ALLEN . . .	New York City.
2d Vice-President,	W. D. STONE	Lexington, Ky.
Recording Secretary,	J. TAFT	Cincinnati, Ohio.
Corresponding Secretary,	J. F. JOHNSTON . . .	Indianapolis, Ind.
Treasurer,	W. A. PEASE	Dayton, Ohio.

PHILADELPHIA, JULY, 1863.

President,	W. H. ALLEN . . .	New York City.
1st Vice-President,	J. H. MCQUILLEN . . .	Philadelphia, Pa.
2d Vice-President,	WM. B. HURD . . .	Brooklyn, N. Y.
Recording Secretary,	J. TAFT	Cincinnati, Ohio.
Corresponding Secretary,	C. R. BUTLER . . .	Cleveland, Ohio.
Treasurer,	A. C. HAWES	New York City.

NIAGARA FALLS, JULY, 1864.

President,	J. H. MCQUILLEN . . .	Philadelphia, Pa.
1st Vice-President,	C. P. FITCH	New York City.
2d Vice-President,	H. BENEDICT	Detroit, Mich.
Recording Secretary,	J. TAFT	Cincinnati, Ohio.
Corresponding Secretary,	GEO. W. ELLIS . . .	Philadelphia, Pa.
Treasurer,	I. J. WETHERBEE . . .	Boston, Mass.

CHICAGO, JULY, 1865.

President,	C. W. SPALDING . . .	St. Louis, Mo.
1st Vice-President,	GEO. H. CUSHING . . .	Chicago, Ill.
2d Vice-President,	JAS. MCMANUS . . .	Hartford, Conn.
Recording Secretary,	J. TAFT	Cincinnati, Ohio.
Corresponding Secretary,	L. D. SHEPARD . . .	Boston, Mass.
Treasurer,	I. J. WETHERBEE . . .	Boston, Mass.

BOSTON, JULY, 1866.

President,	C. P. FITCH	New York City.
1st Vice-President,	W. H. MORGAN . . .	Nashville, Tenn.
2d Vice-President,	L. D. SHEPARD . . .	Boston, Mass.
Recording Secretary,	J. TAFT	Cincinnati, Ohio.
Corresponding Secretary,	A. HILL	Norwalk, Conn.
Treasurer,	W. W. SHEFFIELD . .	New London, Conn.

CINCINNATI, JULY, 1867.

President,	A. LAWRENCE . . .	Lowell, Mass.
1st Vice-President,	P. G. C. HUNT . . .	Indianapolis, Ind.
2d Vice-President,	A. S. TALBERT . . .	Lexington, Ky.
Recording Secretary,	J. TAFT	Cincinnati, Ohio.
Corresponding Secretary,	C. R. BUTLER . . .	Cleveland, Ohio.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

NIAGARA FALLS, JULY, 1868.

President,	JONATHAN TAFT . . .	Cincinnati, Ohio.
1st Vice-President,	HOMER JUDD	St. Louis, Mo.
2d Vice-President,	A. A. BLOUNT . . .	Springfield, Ohio.
Recording Secretary,	EDGAR PARK . . .	St. Louis, Mo.
Corresponding Secretary,	JAS. MCMANUS . . .	Hartford, Conn.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

SARATOGA SPRINGS, AUGUST, 1869.*

President,	HOMER JUDD	St. Louis, Mo.
1st Vice-President,	S. J. COBB	Nashville, Tenn.
2d Vice-President,	C. E. FRANCIS . . .	New York City.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	I. A. SALMON . . .	Boston, Mass.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

NASHVILLE, AUGUST, 1870.

President,	W. H. MORGAN . . .	Nashville, Tenn.
1st Vice-President,	S. W. DENNIS . . .	San Francisco, Cal.
2d Vice-President,	J. R. WALKER . . .	New Orleans, La.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	I. A. SALMON . . .	Boston, Mass.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

* Owing to a change in the Constitution, officers elected at this and the sessions following served at the next annual meeting subsequent to their election; and the sessions of and after 1869 commenced on the first Tuesday in August.

WHITE SULPHUR SPRINGS, VA., AUGUST, 1871.

President,	GEO. H. CUSHING	Chicago, Ill.
1st Vice-President,	C. E. FRANCIS	New York City.
2d Vice-President,	J. R. WALKER	New Orleans, La.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	I. A. SALMON	Boston, Mass.
Treasurer,	W. H. GODDARD	Louisville, Ky.

NIAGARA FALLS, AUGUST, 1872.

President,	P. G. C. HUNT	Indianapolis, Ind.
1st Vice-President,	L. D. SHEPARD	Boston, Mass.
2d Vice-President,	G. A. MILLS	Brooklyn, N. Y.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	J. TAFT	Cincinnati, Ohio.
Treasurer,	W. H. GODDARD	Louisville, Ky.

PUT-IN-BAY, AUGUST, 1873.

President,	T. L. BUCKINGHAM	Philadelphia, Pa.
1st Vice-President,	ISAIAH FORBES	St. Louis, Mo.
2d Vice-President,	A. F. MCLAIN	New Orleans, La.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	J. TAFT	Cincinnati, Ohio.
Treasurer,	W. H. GODDARD	Louisville, Ky.

DETROIT, AUGUST, 1874.

President,	M. S. DEAN	Chicago, Ill.
1st Vice-President,	GEO. W. KEELY	Oxford, Ohio.
2d Vice-President,	J. S. KNAPP	New Orleans, La.
Recording Secretary,	C. STODDARD SMITH	Springfield, Ill.
Corresponding Secretary,	GEO. L. FIELD	Detroit, Mich.
Treasurer,	W. H. GODDARD	Louisville, Ky.

NIAGARA FALLS, AUGUST, 1875.

President,	A. L. NORTHROP	New York City.
1st Vice-President,	H. J. MCKELLOPS	St. Louis, Mo.
2d Vice-President,	H. A. SMITH	Cincinnati, Ohio.
Recording Secretary,	C. STODDARD SMITH	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN	Philadelphia, Pa.
Treasurer,	W. H. GODDARD	Louisville, Ky.

PHILADELPHIA, AUGUST, 1876.

President,	GEO. W. KEELY	Oxford, Ohio.
1st Vice-President,	C. N. PEIRCE	Philadelphia, Pa.
2d Vice-President,	CORYDON PALMER	New York City.
Recording Secretary,	C. STODDARD SMITH	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN	Philadelphia, Pa.
Treasurer,	W. H. GODDARD	Louisville, Ky.

CHICAGO, AUGUST, 1877.

President,	F. H. REHWINKEL . .	Chillicothe, Ohio.
1st Vice-President,	L. D. SHEPARD . . .	Boston, Mass.
2d Vice-President,	GEO. T. BARKER . . .	Philadelphia, Pa.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	M. H. WEBB	Lancaster, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

NIAGARA FALLS, AUGUST, 1878.

President,	H. J. MCKELLOPS. . .	St. Louis, Mo.
1st Vice-President,	L. D. SHEPARD . . .	Boston, Mass.
2d Vice-President,	L. D. CARPENTER . . .	Atlanta, Ga.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	A. O. RAWLS. . . .	Lexington, Ky.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

NIAGARA FALLS, AUGUST, 1879.

President,	L. D. SHEPARD . . .	Boston, Mass.
1st Vice-President,	C. N. PEIRCE . . .	Philadelphia, Pa.
2d Vice-President,	GEO. L. FIELD . . .	Detroit, Mich.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	M. H. WEBB	Lancaster, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

BOSTON, AUGUST, 1880.

President,	C. N. PEIRCE . . .	Philadelphia, Pa.
1st Vice-President,	W. C. BARRETT . . .	Buffalo, N. Y.
2d Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans, La.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	A. M. DUDLEY . . .	Salem, Mass.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

NEW YORK, JULY, 1881.

President,	H. A. SMITH	Cincinnati, Ohio.
1st Vice-President,	W. C. BARRETT . . .	Buffalo, N. Y.
2d Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans, La.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	A. M. DUDLEY . . .	Salem, Mass.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

CINCINNATI, AUGUST, 1882.

President,	W. H. GODDARD . . .	Louisville, Ky.
1st Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans, La.
2d Vice-President,	E. T. DARBY . . .	Philadelphia, Pa.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago, Ill.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

NIAGARA FALLS, AUGUST, 1883.

President,	E. T. DARBY . . .	Philadelphia, Pa.
1st Vice-President,	C. S. STOCKTON . . .	Newark, N. J.
2d Vice-President,	T. T. MOORE .	Columbia, S. C.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN .	Chicago, Ill.
Treasurer,	GEO. W. KEELY	Oxford, Ohio.

SARATOGA SPRINGS, AUGUST, 1884.

President,	J. N. CROUSE . . .	Chicago, Ill.
1st Vice-President,	M. W. FOSTER . . .	Baltimore, Md.
2d Vice-President,	C. F. RICH	Saratoga, N. Y.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago, Ill.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

MINNEAPOLIS, AUGUST, 1885.

President,	W. C. BARRETT . . .	Buffalo, N. Y.
1st Vice-President,	L. C. INGERSOLL . . .	Keokuk, Iowa.
2d Vice-President,	A. T. SMITH	Minneapolis, Minn.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN . .	Chicago, Ill.
Treasurer,	GEO. W. KEELY . .	Oxford, Ohio.

NIAGARA FALLS, 1886.

President,	W. W. ALLPORT . . .	Chicago, Ill.
1st Vice-President,	GEO. W. MCELHANEY . .	Columbus, Ga.
2d Vice-President,	S. W. DENNIS . . .	San Francisco, Cal.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago, Ill.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

NIAGARA FALLS, 1887.

President,	FRANK ABBOTT . . .	New York City.
1st Vice-President,	CHARLES R. BUTLER . .	Cleveland, Ohio.
2d Vice-President,	T. SOLLERS WATERS . .	Baltimore, Md.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

LOUISVILLE, KY., 1888.

President,	C. R. BUTLER . . .	Cleveland, Ohio.
1st Vice-President,	A. W. HARLAN . . .	Chicago, Ill.
2d Vice-President,	SAMUEL A. WHITE . .	Savannah, Ga.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

SARATOGA SPRINGS, 1889.

President,	M. W. FOSTER . . .	Baltimore, Md.
1st Vice-President,	A. W. HARLAN . . .	Chicago, Ill.
2d Vice-President,	J. D. PATTERSON . . .	Kansas City, Mo.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

EXCELSIOR SPRINGS, MO., 1890.

President,	A. W. HARLAN . . .	Chicago, Ill.
1st Vice-President,	J. D. PATTERSON . . .	Kansas City, Mo.
2d Vice-President,	H. B. NOBLE . . .	Washington, D. C.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

SARATOGA SPRINGS, 1891.

President,	W. W. WALKER . . .	New York City.
1st Vice-President,	J. D. PATTERSON . . .	Kansas City, Mo.
2d Vice-President,	S. C. G. WATKINS . . .	Mont Clair, N. J.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	FRED A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER. . . .	St. Louis, Mo.

NIAGARA FALLS, 1892.

President,	J. D. PATTERSON . . .	Kansas City, Mo.
1st Vice-President,	J. Y. CRAWFORD . . .	Nashville, Tenn.
2d Vice-President,	S. C. G. WATKINS . .	Mont Clair, N. J.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

EXECUTIVE COMMITTEE FOR SESSION OF 1893.

J. N. CROUSE, Chairman. C. N. PEIRCE, Secretary.

FIRST DIVISION—COMMITTEE OF ARRANGEMENTS.

J. N. CROUSE. W. W. WALKER. *L. D. SHEPARD.

SECOND DIVISION—ON CREDENTIALS, ETHICS, AND AUDITING ACCOUNTS.

*H. A. SMITH. G. W. MCELHANEY. V. H. JACKSON.

THIRD DIVISION—ON VOLUNTARY ESSAYS.

*C. N. PEIRCE. D. N. MCQUILLEN. S. G. PERRY.

* These go out August, 1893.

CONTENTS.

	PAGE
Disclaimer	2
Officers from date of organization	3
Roll-call	13
Reading of printed minutes dispensed with	19
Executive Committee's Report of programme	19
Publication Committee's Report	19
Treasurer's Report	20
Committee on President's Address appointed	20
Treasurer authorized to pay bills	21
Committee on Voluntary Essays' Report	21
Invitation to members of medical profession	21
Secretary *pro tem.* appointed	22
Report—verbal—of Section I	22
Resolution from Section I	22
Motion of Dr. Allport to strike out Chicago Tooth-Saving Dental College	23
Organization of Sections	23
Report of Committee on President's Address adopted	25, 52
Resolutions offered by the Committee on President's Address	25
Dr. James Truman presents facts regarding Dr. W. H. Dwinelle	25
Credentials Committee's Report	26
Letter from Dr. Odell read	26
Motion to return Dr. Odell's dues for 1892	27
Standing Committee on State and Local Organizations appointed	27
Resolution of Dr. Walker that no dental exhibits be allowed near place of meeting	28
Report of Committee on Revision of Constitution ordered published	28
Questions submitted by Dr. Kirk, Chairman of Committee on State and Local Organizations, and action thereon	29, 55
Dr. John B. Rich's account of the status of dentists *re* the Census Bureau	30
Dr. Shepard's resolutions regarding the same	33
Further action regarding the same	34
Dr. H. A. Smith's motion to reconsider the vote "excluding exhibits"	34
Committee on Necrology reported	34
Thanks to railroads and to Local Committee of Arrangements	35
Motion to pay janitor ten dollars	35

PAGE

Auditing Committee's Report 35
Election of officers 35
Installation of officers 35
Publication Committee appointed 35
Memorial pages 36, 37
Report of Committee on Revision of Constitution 38
Appendix—List of Dental Societies in the United States . . . 201
Standing Resolutions 209

REPORTS AND VOLUNTARY PAPERS.

Annual Address 44
Report of Committee on same 52
Schedule of questions for consideration of State and Local Societies . 55

SECTION VII.—ANATOMY, PATHOLOGY, AND SURGERY.

Report by Truman W. Brophy, Chairman 56
Paper—Pyorrhea Alveolaris, by Junius E. Cravens 58
Remarks—A New Method of Resection of the Inferior Dental Nerve, by M. H. Cryer 66
Paper—The Grinding-Teeth of the Herbivorous Mammalia; by Alton H. Thompson 73
Paper—A Brief Study of the Molar Teeth of the Proboscidea, by W. C. Barrett 83

SECTION I.—PROSTHETIC DENTISTRY, CHEMISTRY, AND METALLURGY.

Verbal Report, by W. B. Ames, Chairman 106
Remarks—On Enameling Gold Crowns, by George Evans . . . 109

A Plea for Aid for Dr. Dwinelle, by James Truman 112

SECTION II.—DENTAL EDUCATION, LITERATURE, AND NOMENCLATURE.

Report by Louis Ottofy, Chairman 116

SECTION III.—OPERATIVE DENTISTRY.

Report by A. W. McCandless, Secretary 123
Paper—Replanting and Transplanting Teeth, by W. N. Morrison . . 126
Paper—Matrices, by Junius E. Cravens 129

SECTION V.—MATERIA MEDICA AND THERAPEUTICS.

Report by George Edwin Hunt, Secretary 140
Report by A. W. Harlan, Chairman 145

SECTION IV.—HISTOLOGY AND MICROSCOPY.

Verbal Report by Frank Abbott, Chairman 162
Paper—Crownless Teeth, by C. W. Stainton 163

SECTION VI.—PHYSIOLOGY AND ETIOLOGY.

PAGE
Report by H. A. Smith, Chairman 176
Report—Examination of Pre-historic Crania, by John J. R. Patrick, Curator of the Investigation 177
Paper—The Effect upon the Tissues of the Oral Cavity produced by the Internal Administration of Certain Drugs, by J. D. Patterson . . 191

DISCUSSIONS.

Pyorrhea Alveolaris—discussed by

Dr. Barrett 59
Dr. Rhein 61
Dr. Morgan 63
Dr. Harlan 63
Dr. Cravens 65

Resection of Inferior Dental Nerve—discussed by

Dr. Patrick . . . 68, 69
Dr. Cryer . . . 68, 69, 71
Dr. A. E. Hoadley . . 69
Dr. Morrison 70
Dr. Fillebrown 70
Dr. Brophy 71

Molar Teeth of the Proboscidea—discussed by

Dr. George E. Hunt . 100, 101
Dr. Barrett . 100, 101, 102, 105
Dr. Truman . . . 101, 102
Dr. Thompson 101
Dr. Peirce 101, 104

Oxyphosphates—discussed by

Dr. Frank W. Low . . 107
Dr. Ames 107
Dr. H. A. Smith 107
Dr. Evans 108

Enameling Gold Crowns—discussed by

Dr. Thompson . . . 110
Dr. Evans . . . 110, 111
Dr. Patterson . . . 110
Dr. Barrett 110
Dr. McKellops . . . 111, 112
Dr. Guilford 111

Plea for Aid for Dr. Dwinelle—discussed by

Dr. Truman 112
Dr. Allport 113
Dr. Morgan 114

Dental Education—discussed by

Dr. Allport 121
Dr. Peirce 121
Dr. Fillebrown . . . 122
Dr. Truman 122
Dr. Horton 122
Dr. Cravens 122
Dr. Sitherwood 122
Dr. Barrett 122
Dr. Ottofy 122

Implantation and Operative Dentistry—discussed by

PAGE

Dr. Head 131
Dr. Morrison . . . 131
Dr. Swasey . . . 131, 138
Dr. McKellops . 132, 135, 136
Dr. Taft 132
Dr. Darby 133
Dr. Morgan . . . 134, 135
Dr. Ottofy 136
Dr. V. H. Jackson . . 137
Dr. Allport 137
Dr. Watkins 138
Dr. Brophy 139

Therapeutics and Antiseptics—discussed by

Dr. Abbott . . . 149, 154
Dr. Marshall . . . 151
Dr. Peabody . . 152, 160
Dr. George E. Hunt . . 153
Dr. Frank W. Low . . 155
Dr. Barrett 155
Dr. Fillebrown . . . 155
Dr. Peirce . . . 156, 159
Dr. Patterson 157
Dr. Taft 157, 158
Dr. Truman . . . 158, 159
Dr. James McManus . . 159
Dr. Harroun 159
Dr. Thomas T. Moore . . 159
Dr. Crawford 160
Dr. Harlan 161

Crownless Teeth—discussed by

Dr. Abbott . . . 167, 170
Dr. Peirce 168
Dr. Morgan . . . 169, 170
Dr. A. O. Hunt . . 169, 170
Dr. Stainton . . 169, 175
Dr. Carroll 170
Dr. Barrett 172
Dr. Morrison 173
Dr. Patrick 173
Dr. Head 174
Dr. Guilford 174

Examination of Pre-historic Crania—discussed by

Dr. Peirce 188
Dr. H. A. Smith . . . 189
Dr. Ottofy 190

The Effect upon the Tissues of the Oral Cavity produced by the Internal Administration of Certain Drugs—discussed by

Dr. W. W. Coon . . . 195
Dr. Fillebrown . . 195, 197
Dr. Morgan . 195, 196, 198, 199
Dr. Kirk . . . 195, 197
Dr. H. A. Smith . . 195, 196
Dr. George E. Hunt . . 196
Dr. Gramm 196
Dr. Horton 197
Dr. Cravens 197
Dr. Barrett 197
Dr. Patterson . . . 198, 199

MINUTES OF TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION,

SESSION OF 1892.

BY GEORGE H. CUSHING, SECRETARY,

AND

A. W. HARLAN, SECRETARY *pro tem.*

FIRST DAY—MORNING SESSION.

THE AMERICAN DENTAL ASSOCIATION commenced its Thirty-second Annual Session in the Orpheus Park Theater, Niagara Falls, N. Y., on Tuesday, August 2, 1892, at 11 A.M., the President, W. W. Walker, in the chair.

Prayer was offered by Rev. A. S. Bacon, of Niagara Falls.

The roll was then called, and the following were found either to be present or to have forwarded their dues:

ABBOTT, FRANK	22 West Fortieth st., New York.
ALLPORT, W. W.	Venetian Building, Chicago, Ill.
AMES, W. B.	Venetian Building, Chicago, Ill.
*ATKINSON, CHAS. B.	41 East Ninth st., New York.
BROWN, S. B.	Fort Wayne, Ind.
BARRETT, W. C.	208 Franklin st., Buffalo, N. Y.
BUTLER, C. R.	519 Euclid ave., Cleveland, O.
*BAIRD, W. H.	4th and Washington sts., Burlington, Ia.
BOGUE, E. A.	29 East Twentieth st., New York.
BOICE, ALONZO	1612 Vine st., Philadelphia, Pa.
*BRACKETT, C. A.	102 Touro st., Newport, R. I.
BARNES, HENRY	75 Kendall Building, Cleveland, O.

Those marked thus (*) were not present, but sent their dues.
Those marked thus (*d*) were delegates, but not permanent members.

BROPHY, TRUMAN W.	96 State st., Chicago, Ill.
*BALDWIN, A. E.	828 West Adams st., Chicago, Ill.
*BROWN, A. E.	1911 Michigan ave., Chicago, Ill.
BARBER, L. L.	311 Summit st., Toledo, O.
BOSWELL, H. H.	322 Franklin st., Buffalo, N. Y.
BURKHART, H. J.	Batavia, N. Y.
d BUTLER, C. S.	680 Main st., Buffalo, N. Y.
COWIE, HENRY	Cor. Gratiot ave. and Farrar st., Detroit, Mich.
CUSHING, GEORGE H.	96 State st., Chicago, Ill.
CROUSE, J. N.	2231 Prairie ave., Chicago, Ill.
*CHAIM, M. L.	30 Cooper Institute, New York.
*COOK, C. D.	133 Pacific st., Brooklyn, N. Y.
*CLELAND, JAMES	152 Woodward ave., Detroit, Mich.
*CLAPP, DWIGHT M.	62 Trinity Terrace, Boston, Mass.
*CONRAD, WM.	321 North Grand ave., St. Louis, Mo.
*CUSTER, LEVITT E.	Dayton, Ohio.
*CURTIS, G. L.	115 East Jefferson st., Syracuse, N. Y.
*CHITTENDEN, C. C.	21 West Main st., Madison, Wis.
CASE, C. S.	Jackson, Mich.
*COLDING, HENRY S.	105 Jones st., Savannah, Ga.
CRAVENS, J. E.	Indianapolis, Ind.
CRAWFORD, J. Y.	Nashville, Tenn.
*CASSIDY, J. S.	732 Madison ave., Covington, Ky.
*CHASE, EMMA E.	2602 Locust st., St. Louis, Mo.
*CULVER, M. B.	115 S. Seventeenth st., Philadelphia, Pa.
CARROLL, C. C.	Meadville, Pa.
COLE, H. J.	Norfolk, Neb.
CRYER, M. H.	1527 Arch st., Philadelphia, Pa.
CLARK, W. G.	Kimball Building, Cedar Rapids, Iowa.
COOLEY, M. O.	Niagara Falls, N. Y.
CHENEY, GEO. F.	3 Central st., St. Johnsbury, Vt.
d COON, W. W.	Alfred Center, N. Y.
*DAVENPORT, I. B.	30 Avenue de l'Opera, Paris, France.
DARBY, EDWIN T.	1513 Walnut st., Philadelphia, Pa.
*DUNN, CHARLES E.	529 Second st., Louisville, Ky.
*DOUGLASS, B.	Appleton, Wis.
DOYLE, B. OSCAR	735 West Jefferson st., Louisville, Ky.
*DWINELLE, W. H.	41 West Thirty-fourth st., New York.
DONNALLY, WILLIAMS	1022 Fourteenth st., Washington, D. C.
DUNN, J. AUSTIN	70 Dearborn st., Chicago, Ill.
DEWEY, S. B.	Cleveland, O.
EVANS, GEO.	133 West Thirty-fourth st., New York.
EDWARDS, C. G.	717 Fourth st., Louisville, Ky.
*FARRAR, J. N.	1271 Broadway, cor. Thirty-second st., New York.
FULLER, A. H.	2602 Locust st., St. Louis, Mo.

*FREEMAN, A. W.	1208 Venetian Building, Chicago, Ill.
*FUNDENBERG, W. H.	958 Penn ave., Pittsburgh, Pa.
FINLEY, M. F.	1928 I st., Washington, D. C.
FIELD, GEO. L.	Abstract Building, Detroit, Mich.
FREEMAN, S. A.	641 Main st., Buffalo, N. Y.
*FRIEDRICHS, GEO. J.	155 St. Charles st., New Orleans, La.
FILLEBROWN, THOMAS	264 Boylston st., Boston, Mass.
FOSTER, M. W.	9 West Franklin st., Baltimore, Md.
*FUNDENBERG, W. F.	958 Penn ave., Pittsburgh, Pa.
*FREEMAN, S.	1109 Lexington ave., New York.
*FLOYD, E. A.	Paola, Kas.
*FREEMAN, ARTHUR B.	325 West Madison st., Chicago, Ill.
*FRIEDRICHS, A. G.	155 St. Charles st., New Orleans, La.
GAYLORD, EDWARD S.	632 Chapel st., New Haven, Conn.
GUILFORD, S. H.	1628 Chestnut st., Philadelphia, Pa.
GARDINER, FRANK H.	126 State st., Chicago, Ill.
*GILMER, T. L.	55 Thirty-third st., Chicago, Ill.
*GODDARD, C. L.	131 Post st., San Francisco, Cal.
*GRISWOLD, W. E.	Mack Block, Sixteenth and California sts., Denver, Col.
GASKILL, J. HOWARD	1313 Arch st., Philadelphia, Pa.
GRAMM, CARL T.	Keokuk, Ia.
GOODRICH, CHAS. H.	494 Endicott Arcade, St. Paul, Minn.
GILSON, ALFRED H.	7 Temple Place, Boston, Mass.
HARROUN, C. H.	223 Summit st., Toledo, O.
*HOYSRADT, G. W.	Ithaca, N. Y.
HARLAN, A. W.	Masonic Temple, Chicago, Ill.
*HOLMES, E. S.	103 Ottawa st., Grand Rapids, Mich.
*HUNT, P. G. C.	143 North Pennsylvania st., Indianapolis, Ind.
HOFF, N. S.	Ann Arbor, Mich.
*HOW, W. STORER	Chestnut st., cor. Twelfth, Philadelphia, Pa.
HETRICK, F. O.	Ottawa, Kas.
*HACKER, T. S.	28½ East Ohio st., Indianapolis, Ind.
HUNT, A. O.	Iowa City, Ia.
*HAWES, EARL P.	88 Westminster st., Providence, R. I.
HORTON, W. P.	177 Euclid ave., Cleveland, O.
*HEWITT, C. B.	718 Troost ave., Kansas City, Mo.
HUNT, GEORGE EDWIN	143 North Pennsylvania st., Indianapolis, Ind.
HARVEY, H. F.	44 Euclid ave., Cleveland, O.
HOWARD, FRANKLIN E.	331 Franklin st., Buffalo, N. Y.
HEAD, JOSEPH	1626 Chestnut st., Philadelphia, Pa.
HARPER, JOHN G.	803 Pine st., St. Louis, Mo.
d HARTMAN, S. B.	Fort Wayne, Ind.
*INGERSOLL, L. C.	Keokuk, Ia.

*Jackson, H. H.	317 Jefferson ave., Detroit, Mich.
Johnson, C. N.	612 Opera House, Chicago, Ill.
Jackson, V. H.	240 Lenox ave., New York.
Jefferis, C. R.	908 King st., Wilmington, Del.
Jack, Louis	1533 Locust st., Philadelphia, Pa.
James, T. L.	Fairfield, Ia.
*Johnston, S. E.	409 Delaware st., Leavenworth, Kas.
Jones, Victor S.	Bethlehem, Pa.
Jackman, W. T.	106 Euclid ave., Cleveland, O.
*Knowles, Samuel E.	S. E. cor. Post and Stockton sts., San Francisco, Cal.
*Keith, H. H.	3140 Olive st., St. Louis, Mo.
*Keech, Edw'd P.	525 North Charles st., Baltimore, Md.
*Knepper, Germannus	24 West First st., Los Angeles, Cal.
Knapp, J. Rollo	102 Canal st., New Orleans, La.
King, H. T.	Fremont, Neb.
Kirk, Edward C.	1807 Chestnut st., Philadelphia, Pa.
Kulp, W. O.	Davenport, Ia.
Kingsley, F. J.	Towanda, Pa.
Kratzer, C. V.	111 North Fifth st., Reading, Pa.
*Litch, Wilbur F.	1507 Walnut st., Philadelphia, Pa.
Lathrop, Joseph	271 Woodward ave., Detroit, Mich.
Luckey, B. F.	Paterson, N. J.
Levy, Fred. A.	343 Main st., Orange, N. J.
*Ludwig, R. F.	34 Monroe st., Chicago, Ill.
*Lowry, H. S.	1106 Main st., Kansas City, Mo.
*Letord, J. S.	548 Main st., Kansas City, Mo.
Lyon, L. W.	916 Pioneer Press Bldg., St. Paul, Minn.
Libbey, J. A.	548 Smithfield st., Pittsburgh, Pa.
Line, J. E.	39 State st., Rochester, N. Y.
*Le Roy, Louis C.	226 Fifth St., New York.
d Low, Frank W.	15 Court st., Buffalo, N. Y.
*Morgan, Henry W.	211 North High st., Nashville, Tenn.
Morrison, W. N.	1401 Washington ave., St. Louis, Mo.
Morgan, W. H.	211 North High st., Nashville, Tenn.
*Maercklein, B. G.	Iron Block, Milwaukee, Wis.
*Meng, John W.	Lexington, Mo.
Marshall, John S.	1012 Venetian Building, Chicago, Ill.
*Maercklein, Robt.	Iron Block, Milwaukee, Wis.
Moore, J. Hall	104 North Ninth st., Richmond, Va.
Monfort, J. B.	Fairfield, Ia.
Molyneaux, Grant	S. E. cor. Seventh and Elm sts., Cincinnati, O.
Mitchell, Grant	Cor. Tuscarawas st. and Cleveland ave., Canton, O.
Moore, T. T.	Columbia, S. C.
McManus, James	32 Pratt st., Hartford, Conn.

McKellops, H. J.	2630 Washington ave., St. Louis, Mo.
McCandless, A. W.	1001 Masonic Temple, Chicago, Ill.
*McElhaney, G. W.	1147½ Broad st., Columbus, Ga.
McManus, Henry	32 Pratt st., Hartford, Conn.
McQuillen, Daniel N.	1628 Chestnut st., Philadelphia, Pa.
*Noble, H. B.	600 Thirteenth st., cor. F, Washington, D. C.
*Northrop, A. L.	57 West Forty-ninth st., New York.
*Newby, James B.	2640 Washington ave., St. Louis, Mo.
d Nason, A. W.	Fifteenth and Harney sts., Omaha, Neb.
*Odell, F. M.	159 West Thirty-fourth st., New York.
Ottofy, Louis	Masonic Temple, Chicago, Ill.
Peirce, C. N.	1415 Walnut st., Philadelphia, Pa.
*Palmer, Stewart B.	39½ Warren st., Syracuse, N. Y.
Patrick, J. J. R.	Belleville, Ill.
Perry, S. G.	46 West Thirty-seventh st., New York.
*Pruyn, Chas. P.	70 Dearborn st., Chicago, Ill.
Priest, A. N.	286 Genesee st., Utica, N. Y.
*Page, W. E.	16 Arlington st., Boston, Mass.
Patterson, J. D.	Keith & Perry Building, Kansas City, Mo.
*Palmer, J. W.	Fitchburg, Mass.
Peabody, Francis	301 West Chestnut st., Louisville, Ky.
Palmer, Corydon	Warren, O.
Prittie, W. H.	88 State st., Chicago, Ill.
Pease, E. H.	Arcade, Euclid ave., Cleveland, O.
*Remington, F. A.	57 West Forty-ninth st., New York.
Rhein, Meyer L.	104 East Fifty-eighth st., New York.
*Rohland, C. B.	123 Third st., Alton, Ill.
Rich, John B.	1309 Connecticut ave., Washington, D. C.
*Roberts, Norman J.	Waukegan, Ill.
Ritchey, Jessie M.	Des Moines, Ia.
Smith, H. A.	128 Garfield Place, Cincinnati, O.
Shepard, L. D.	330 Dartmouth st., cor. Beacon, Boston, Mass.
*Smith, Eugene H.	283 Dartmouth st., Boston, Mass.
*Stockton, C. S.	17 West Park st., Newark, N. J.
Swain, E. D.	65 Randolph st., Chicago, Ill.
*Stevens, B. Q.	Hannibal, Mo.
*Shryock, W. W.	27 West Berry st., Fort Wayne, Ind.
Swasey, James A.	3003 Michigan ave., Chicago, Ill.
*Sibley, A. H.	800 North Sixteenth st., Philadelphia, Pa.
*Starr, A. R.	164 East Ninety-first st., New York.
*Smith, Marvin E.	163 State st., Chicago, Ill.
*Smith, J. H.	250 York st., New Haven, Conn.

*SMITH, P. T.	Tabor Opera House, Denver, Col.
*SHATTUCK, E. E.	1100 Main st., Kansas City, Mo.
*STUBBLEFIELD, D. R.	Nashville, Tenn.
*SHULZE, W. H.	Atchison, Kas.
*STEBBINS, E. A.	Shelburne Falls, Mass.
SANGER, R. M.	557 Main st., Orange, N. J.
*SILL, CHARLES	301 West Twelfth st., New York.
SMITH, DWIGHT	3 East Forty-seventh st., New York.
SMITH, B. HOLLY	926 Madison ave., Baltimore, Md.
STAINTON, C. W.	47 North Pearl st., Buffalo, N. Y.
SOUTHWICK, A. P.	11 Niagara st., Buffalo, N. Y.
SEIP, HOWARD S.	Allentown, Pa.
SMITH, H. T.	128 West Eighth st., Cincinnati, O.
SITHERWOOD, GEO. D.	Bloomington, Ill.
STEPHAN, J. F.	29 Euclid ave., Cleveland, O.
d SITES, H. C.	Fort Wayne, Ind.
TAFT, J.	122 West Seventh st., Cincinnati, O.
TRUMAN, JAMES	3249 Chestnut st., W. Philadelphia, Pa.
THOMPSON, A. H.	721 Kansas ave., Topeka, Kas.
TAYLOR, L. C.	26 Pratt st., Hartford, Conn.
THOMAS, J. D.	912 Walnut st., Philadelphia, Pa.
THOMPSON, HENRY C.	113 Penn'a ave., Washington, D. C.
*TALBOT, EUGENE S.	125 State st., Chicago, Ill.
TURNER, V. E.	107½ Fayetteville st., Raleigh, N. C.
*VAN VLECK, CHAS. K.	536 Warren st., Hudson, N. Y.
*VOLCK, A. J.	338 North Charles st., Baltimore, Md.
WENDEL, W. C.	107 Wisconsin st., Milwaukee, Wis.
*WATERS, GEO. F.	6 Somerset st., Boston, Mass.
*WILSON, I. P.	317 North Fourth st., Burlington, Ia.
WATKINS, S. C. G.	Mont Clair, N. J.
*WHITE, SAMUEL A.	134 Jones st., Savannah, Ga.
WALKER, W. W.	67 West Ninth st., New York.
WASSALL, J. W.	208 Dearborn ave., Chicago, Ill.
WATERS, T. S.	Baltimore, Md.
*WHITSLAR, W. H.	265 W. Boardman st., Youngstown, O.
WINDER, R. B.	716 Park ave., Baltimore, Md.
*WHITSLAR, F. S.	265 W. Boardman st., Youngstown, O
*WILLIAMS, JACOB L.	1 Mt. Vernon st., Boston, Mass.
*WOLF, J. L.	1313 New York ave., Washington, D.C.
WHIPPLE, J. W.	3036 Locust st., St. Louis, Mo.
d WEISELL, W. ELLIS	Fort Wayne, Ind.
YOUNG, H. NEWTON	Wilkes-Barre, Pa.

Any inaccuracies in the above list in name or location should be reported to the Treasurer at once, in order that the necessary corrections may be made.

Annual dues being payable in advance, no name appears on the above list except those who have paid for 1892, and the Transactions are not sent to any who have not fully paid their dues.

Dues must be paid to the Treasurer. Send draft, P. O. money order, or express order.

A. H. FULLER, *Treasurer*, 2602 Locust st., St. Louis, Mo.

The reading of the printed minutes was, on motion, dispensed with.

The Executive Committee offered as a temporary report the printed programme.

On motion, it was accepted.

The Publication Committee offered their report, as follows:

REPORT OF PUBLICATION COMMITTEE.

NIAGARA FALLS, August 2, 1892.

The Publication Committee would respectfully report that at the last annual meeting, held at Saratoga Springs, the Association, by vote, instructed the Executive Committee to endeavor to make arrangements with The S. S. White Dental Manufacturing Company to again publish the Transactions, as they formerly had done. Such arrangements were completed, and the Transactions were published by them upon the same terms as before.

To Mr. Hise's care and attention to details the thanks of the Committee are again due, and the proof of the value of his services is to be found in the admirable volume which they issued.

The Transactions were mailed January 12, 1892, and were distributed, as usual, to the Societies, Libraries, Journals, Honorary and Active Members that were entitled to them, and there are now on hand about seventy copies.

RECEIPTS AND EXPENDITURES.

Received:		
From Treasurer	$120 50	
" sale of Transactions	3 00	
		$123 50
Expended:		
For expressage, paper, and copying	$15 65	
Postage	8 00	
Knight & Leonard, printing	4 50	
Engrossing memorial	16 00	
The S. S. White Dental Manufacturing Company's bill, postage and mailing	70 50	
		$114 65
Balance due the Association		$8 85

GEO. H. CUSHING, *Chairman.*

Audited and found correct.

H. A. SMITH,
V. H. JACKSON, } *Auditing Committee.*

The Treasurer's report was then read.

REPORT OF THE TREASURER.

NIAGARA FALLS, August 2, 1892.

THE AMERICAN DENTAL ASSOCIATION IN ACCOUNT WITH A. H. FULLER, TREASURER.

By balance on hand August 4, 1891	$1193 42	
" dues received to date	1025 00	
" cash received from Michigan State Dental Society	25 00	
Total		$2243 42

DISBURSEMENTS.

A. C. Rich, Chairman Local Committee, for rent, etc.	66 67	
J. N. Crouse, Chairman Executive Committee, postage, printing, expressage, etc.	161 10	
Thos. Fillebrown, bills for printing, writing, and postage	19 68	
John M. Putnam, janitor	10 00	
L. Ottofy, mailing notices, printing, postage, etc.	14 90	
Geo. H. Cushing, balance due Publication Committee	4 50	
Geo. H. Cushing, reporter's salary	125 00	
Geo. H. Cushing, salary Recording Secretary	200 00	
A. H. Fuller, Treasurer, salary	100 00	
John J. R. Patrick, Section VI.	200 00	
A. H. Fuller, printing and postage	11 00	
Geo. H. Cushing, Chairman Publication Committee, sundry expenses	50 00	
S. S. White Dental Manufacturing Company, binding Transactions, postage, etc.	70 50	
Total		$1033 35
Balance on hand		$1210 07

Audited and found correct, August 5, 1892.

H. A. SMITH,
V. H. JACKSON, } *Auditing Committee.*

The President, Dr. Walker, then read the annual address; the Vice-President, Dr. J. D. Patterson, in the chair.

On motion of Dr. Foster, the Vice-President appointed the following Committee to report upon the President's address: E. C. Kirk, L. D. Shepard, and J. N. Crouse.

The times and places of meeting of the Sections were then announced.

On motion, the Treasurer was authorized to pay all properly authenticated bills.

The Committee on Voluntary Essays reported, through Dr. C. N. Peirce, a paper from C. W. Stainton, of Buffalo, on "Crownless Teeth," which they had referred to Section IV.

On motion, adjourned to meet at 7 P.M.

FIRST DAY—EVENING SESSION.

The Association was called to order at 8.15, the President in the chair.

The minutes of the morning session were read and approved.

There being no miscellaneous business, Section VII was called, and its Chairman, Dr. Brophy, read the report of the Section, giving a list of publications during the year, and recommending to be read the following papers:

"On Pyorrhea Alveolaris," by J. E. Cravens; "A New Operation for Resection of the Inferior Dental Nerve," by M. H. Cryer; "The Grinding-Teeth of the Herbivorous Mammalia," by A. H. Thompson; and "A Brief Study of the Molar Teeth of the Proboscidiæ," by W. C. Barrett, with exhibition of specimens.

Dr. Cravens then read his paper, which was discussed by Drs. Barrett, Rhein, Morgan, and Harlan, the discussion being closed by Dr. Cravens.

Dr. M. H. Cryer, of Philadelphia, then described a new operation for "Resection of the Inferior Dental Nerve."

Discussed by Drs. Patrick and A. E. Hoadley, M.D., of Chicago. At this point, on motion of Dr. Brophy, the courtesies of the floor were extended to members of the medical profession present. Discussion was continued by Drs. Morrison, Fillebrown, and Brophy, and closed by Dr. Cryer.

A motion to postpone the further reading of papers was lost.

Dr. A. H. Thompson then read his paper, entitled "The Grinding-Teeth of the Herbivorous Mammalia."

On motion of Dr. Harlan, the Association adjourned to 9 A.M. Wednesday.

SECOND DAY—MORNING SESSION.

The Association was called to order at 9.40 A.M., the President, Dr. Walker, in the chair.

The President stated that owing to the illness of the Secretary, Dr. Cushing, it would be necessary to appoint a Secretary *pro tem.* He therefore nominated Dr. A. W. Harlan to act temporarily, which was concurred in by the Association.

The minutes of the preceding session were then read and approved.

There being no miscellaneous business, Section VII was again called.

Dr. Barrett read his paper, "A Study of the Molar Teeth of the Proboscidiæ."

Discussed by Drs. Geo. E. Hunt, Truman, Thompson, Peirce, and closed by Dr. Barrett. Subject passed.

Section I being called, its Chairman, Dr. Ames, stated that Dr. Geo. Evans would describe a "New Method of Enameling Gold Crowns."

Dr. Ames then described the properties of oxyphosphate of copper.

The Section recommended that Dr. G. W. Melotte be invited to give a clinic.

On motion of Dr. Peirce, the following was adopted:

WHEREAS, Section I has been unable in recent years to obtain sufficient matter to make a proper report; and

WHEREAS, It is the opinion of the Section that it is properly entitled to papers on crown-work, bridge-work, and orthodontia; therefore, be it

Resolved, That hereafter all papers on these subjects shall be submitted to Section I.

Discussion on oxyphosphate of copper was participated in by Drs. F. W. Low, Ames, H. A. Smith, and Geo. Evans.

Dr. Geo. Evans then described his method of enameling the labial surfaces of bicuspid gold crowns.

Discussed by Drs. A. H. Thompson, Evans, Priest, Patterson, Barrett, McKellops, and Guilford, and the subject was passed.

Section II was then called, and Dr. Ottofy, its Chairman, read the report of the Section.

Discussed by Drs. Allport, A. O. Hunt, and Patterson.

Dr. Allport here moved that all reference to the Chicago Tooth-Saving Dental College be stricken out of the report.

Discussed by Drs. Fillebrown, Patterson, Truman, W. P. Horton, Cravens, Sitherwood, and Barrett.

The motion was lost.

The organization of Sections was then called for, with the following result:

ORGANIZATION OF SECTIONS.

SECTION I. Prosthetic Dentistry, Chemistry, and Metallurgy.—R. M. Sanger, chairman; Alonzo Boice, secretary; C. H. Harroun, C. S. Case, A. O. Hunt, T. S. Waters, W. T. Jackman, A. N. Priest, George Evans, H. S. Seip, J. H. Gaskill, E. S. Gaylord, B. F. Luckey, V. S. Jones, H. N. Young, W. B. Ames, J. G. Harper, E. C. Kirk, D. N. McQuillen, Jas. McManus, Chas. P. Pruyn, C. W. Stainton, Grant Mitchell, Dwight Smith, J. Austin Dunn, C. C. Carroll, W. E. Griswold, C. V. Kratzer, B. Q. Stevens, J. N. Farrar, Geo. F. Root, W. H. Fundenberg, J. F. Stephan, H. H. Boswell, Grant Mollyneaux, W. G. Clark, Henry McManus, W. H. Buckley, A. E. Baldwin, C. A. Billings, L. L. Barber, Wm. Conrad, W. R. Clifton, W. A. Coston, D. E. Coulson, I. B. Davenport, B. Douglas, B. Oscar Doyle, W. H. Dwinelle, G. C. Daboll, C. E. Esterly, C. G. Edwards, A. E. Griggs, Chas. H. Goodrich, A. H. Gilson, F. O. Hetrick, T. S. Hacker, T. T. Hayward, C. B. Hewitt, E. P. Hazen, J. G. Hollingsworth, H. H. Jackson, Edward P. Keech, G. Knepper, D. E. Kelley, B. G. Maercklein, John W. Meng, Robt. Maercklein, A. L. Northrop, J. W. Palmer, C. J. Peterson, W. H. Prittie, E. H. Pease, M. E. Smith, J. H. Smith, P. T. Smith, E. E. Shattuck, C. A. Timme, W. C. Wendell.

SECTION II. Dental Education, Literature, and Nomenclature.—Louis Ottofy, chairman; S. H. Guilford, secretary; C. R. Butler, C. N. Peirce, J. Taft, A. H. Thompson, J. N. Crouse, W. W. Allport, E. S. Holmes, C. W. Stainton, Arthur B. Freeman, S. B. Dewey, Jacob L. Williams, Wilbur F. Litch, J. N. Farrar, W. O. Kulp, Edmund Noyes, J. Hall Moore, Joseph Head, J. D. Thomas, H. B. Noble, S. B. Brown, J. Adams Bishop, E. A. Bogue, C. D. Cook, James Cleland, G. L. Curtis, C. C. Chittenden, Henry S. Colding,

I. B. Davenport, E. T. Darby, P. G. C. Hunt, James B. Hodgkin, C. R. E. Koch, F. J. Kingsley, Joseph Lathrop, F. A. Levy, H. S. Lowry, J. S. Letord, Louis C. Le Roy, W. H. Morgan, Geo. W. McElhaney, Jas. B. Newby, R. E. Nickles, C. B. Rohland, Jessie M. Ritchey, Geo. H. Cushing, L. D. Shepard, B. Holly Smith, R. A. Wasson, J. L. Wolf, John B. Rich.

SECTION III. Operative Dentistry.—A. W. McCandless, chairman; J. E. Cravens, secretary; S. C. G. Watkins, M. F. Finley, A. P. Southwick, F. Peabody, J. Y. Crawford, C. N. Johnson, W. N. Morrison, J. McManus, Thos. Fillebrown, T. T. Moore, W. W. Allport, J. A. Libbey, Wm. H. Shulze, S. B. Palmer, C. K. Van Vleck, W. E. Page, Wms. Donnally, Corydon Palmer, H. J. Cole, C. V. Kratzer, S. E. Johnston, C. S. Stockton, M. B. Culver, S. E. Knowles, W. H. Baird, A. H. Fuller, Geo. F. Cheney, W. H. Fundenberg, W. F. Fundenberg, H. J. Burkhart, Louis Jack, J. B. Monfort, Earl P. Hawes, Wm. J. Martin, W. W. Shryock, V. H. Jackson, Eugene H. Smith, H. F. Harvey, G. W. Hoysradt, S. G. Perry, Joseph Head, Henry Barnes, F. E. Howard, S. Freeman, S. B. Brown, A. E. Brown, Henry Cowie, Dwight M. Clapp, G. L. Curtis, E. T. Darby, C. E. Dunn, Geo. L. Field, R. F. Ludwig, L. W. Lyon, Henry W. Morgan, H. H. Miller, Geo. W. McElhaney, F. A. Remington C. B. Rohland, John B. Rich, L. D. Shepard, M. V. Toledo, H. H. Jackson.

SECTION IV. Histology and Microscopy.—Frank Abbott, chairman, T. L. James, secretary; E. D. Swain, W. H. Eames, B. F. Luckey, J. Edward Line, Theodore Stanley, C. T. Gramm, W. X. Sudduth, J. Adams Bishop, L. L. Davis, A. Wilkes Smith, A. H. Sibley, L. C. Taylor, Henry C. Thompson, R. A. Wasson.

SECTION V. Materia Medica and Therapeutics.—A. W. Harlan, chairman; George E. Hunt, secretary; Geo. D. Sitherwood, James Truman, H. T. Smith, W. W. Walker, N. S. Hoff, J. W. Whipple, M. W. Foster, F. H. Gardiner, J. S. Cassidy, Wms. Donnally, M. B. Culver, E. A. Stebbins, Geo. F. Cheney, Alfred R. Starr, Chas. B. Atkinson, Emma E. Chase, J. G. Reid, Wm. P. Richards, James A. Swasey.

SECTION VI. Physiology and Etiology.—H. A. Smith, chairman; L. E. Custer, secretary; W. P. Horton, J. J. R. Patrick, J. D. Patterson, W. C. Barrett, H. J. McKellops, A. H. Thompson, E. S. Talbot, G. F. Waters, Theodore Stanley, L. C. Ingersoll, W. Storer How, W. X. Sudduth, Chas. B. Atkinson, Geo. J. Friedrichs, Jessie M. Ritchey, V. E. Turner, Samuel A. White, J. W. Wassall, W. Ellis Weisell, I. B. Davenport, Frank W. Low.

SECTION VII. Anatomy, Pathology, and Surgery.—T. W. Brophy, chairman; M. L. Rhein, secretary; M. H. Cryer, J. S. Marshall, W. C. Barrett, M. G. Jenison, H. T. King, J. Edward Line, T. L. Gilmer, C. A. Brackett, Arthur B. Freeman, C. C. Carroll, N. J. Roberts, I. P. Wilson, C. T. Gramm, S. E. Knowles, W. H. Whitslar, C. Sill, A. E. Baldwin, A. G. Friedrichs, W. W. Vance, A. J. Volck, J. W. Wassall, F. S. Whitslar, I. B. Davenport.

There being no miscellaneous business, the Association adjourned until 7.30 P.M.

SECOND DAY—EVENING SESSION.

The Association convened at 8 P.M., the President, Dr. Walker, in the chair.

The minutes were then read and approved.

The report of the Committee on the President's address was then read by Dr. Shepard.

During the reading of this report the chair was occupied by the Vice-President, Dr. J. D. Patterson. Dr. Marshall moved that the report be received and its recommendations adopted.

This was carried unanimously.

The following are the Resolutions adopted by this action:

Resolved, That an appropriation of five hundred (500) dollars be made from the funds of the Association to the treasury of the World's Columbian Dental Congress.

Resolved, That a Standing Committee, to be styled the "Committee on State and Local Organization," and composed of three members, shall be appointed, originally for terms of one, two, and three years respectively, and that all vacancies due to expiration of term shall thereafter be filled for terms of three years. All vacancies occurring from any other cause shall be filled for the unexpired term.

The basis of the plan and scope of work of said Committee, and its duties in relation thereto, shall be the suggestions as set forth in the address of the President of the American Dental Association for the year 1892; also the articles from which he quotes, and in harmony with the circular letters issued by the Chairman of the Executive Committee.

Resolved, That the annual meeting of this Association for the year 1893 be convened at the time and for the purpose suggested in the President's address, Tuesday, August 15, 1893; the meeting to be simply a business one for the election of officers, routine business, and the consideration of the report of the Special Committee to whom was referred the amendment of the Constitution and By-Laws; and that the consideration of the report of the Special Committee embodying certain proposed amendments to the Constitution and By-Laws be laid over for consideration at that meeting.

Dr. James Truman rose to a question of privilege, which being granted, he presented some facts regarding Dr. W. H. Dwinelle. Remarks were also made by Drs. Allport and Morgan, which will be found at the close of the discussion on Section II.

The Committee on Credentials made a partial report, which was subsequently completed as follows:

REPORT OF COMMITTEE ON CREDENTIALS.

Alumni Society of Philadelphia Dental College—M. H. Cryer.
American College of Dental Surgery—John S. Marshall.
Chicago College of Dental Surgery—T. W. Brophy.
Connecticut State Dental Association—Henry McManus.
Dental Department of the State University of Iowa—W. O. Kulp.
Eighth District Dental Society of New York—H. J. Burkhart, C. W. Stainton, C. S. Butler, A. P. Southwick, H. H. Boswell, W. W. Coon, F. E. Howard, M. O. Cooley.
Harvard University, Dental School—Thos. Fillebrown.
Hayden Dental Society of Chicago—Louis Ottofy.
Illinois State Dental Society—Louis Ottofy, J. A. Swasey, George H. Cushing, F. H. Gardiner, J. N. Crouse, J. W. Wassall, E. D. Swain, G. D. Sitherwood, W. B. Ames, J. Austin Dunn.
Iowa State Dental Society—Carl T. Gramm, W. G. Clark.
Indiana State Dental Association—S. B. Hartman, W. Ellis Weisell, S. B. Brown.
Isaac Knapp Dental Coterie of Fort Wayne, Ind.—H. C. Sites.
Kentucky State Dental Association—C. G. Edwards.
Massachusetts Dental Society—A. H. Gilson.
Minnesota State Dental Association—Charles H. Goodrich, L. W. Lyon.
Mississippi Valley Dental Association—H. T. Smith.
Missouri Dental Association—W. N. Morrison.
Missouri Dental College—A. H. Fuller.
Nebraska State Dental Society—H. J. Cole, A. W. Nason.
New York State Dental Society—V. H. Jackson, J. Edward Line.
North Carolina Dental Society—V. E. Turner.
Northern Ohio Dental Association—L. L. Barber, Grant Mitchell, W. T. Jackman, J. F. Stephan, S. B. Dewey, E. H. Pease.
Odontological Society of Chicago—A. W. Harlan, W. B. Ames.
Odontological Society of Pennsylvania—S. H. Guilford, Louis Jack, Joseph Head, J. D. Thomas.
Pennsylvania College of Dental Surgery—C. N. Peirce.
Pennsylvania State Dental Society—J. A. Libbey, C. V. Kratzer.
St. Louis Dental Society—J. W. Whipple.
Susquehanna Dental Association of Pennsylvania—H. Newton Young, Howard S. Seip, F. J. Kingsley.
United States Dental College—W. H. Prittie.
Vermont State Dental Society—George F. Cheney.
Virginia State Dental Association—J. Hall Moore.
Washington City Dental Society—Wms. Donnally, H. C. Thompson.

The Secretary read a letter from Dr. F. M. Odell offering his resignation, which on motion was accepted.

On motion of Dr. Taft, the dues of Dr. Odell for 1892 were ordered to be returned to him.

There being no further miscellaneous business, Section III was called.

The Chairman of the Section, Dr. C. S. Stockton, being absent, the Secretary, Dr. A. W. McCandless, read the report, which was accepted.

Dr. W. N. Morrison then read his paper, entitled "Transplantation and Replantation."

Dr. J. E. Cravens's paper on "Matrices" was read by Dr. Geo. E. Hunt.

These papers were discussed by Drs. Joseph Head, Morrison, Swasey, McKellops, J. Taft, Darby, Ottofy, Jackson, Allport, Watkins, and Brophy.

The President appointed as a Standing "Committee on State and Local Organization," as provided for by the adoption of the Committee's report on the President's address, Drs. E. C. Kirk, Louis Jack, and J. N. Crouse.

On motion of Dr. Brophy, the Association adjourned to 9 A.M. Thursday.

THIRD DAY—MORNING SESSION.

The Association was called to order at 9.20 A.M., the President, Dr. Walker, in the chair.

The Credentials Committee made a partial report, and was granted further time.

On motion, Section III was taken up and passed. Section IV was called, and, none of the officers being present, Section V was called.

The Chairman reported two papers,—one from the Secretary, and one from the Chairman.

Dr. Geo. E. Hunt then read a report on "Dental Therapeutics,"

after which Dr. A. W. Harlan read a paper on "Europhen, Trichloracetic Acid, and Syrup of Iron Chloride."

Discussed by Drs. Abbott, Marshall, Peabody, G. E. Hunt, F. W. Low, Fillebrown, Peirce, Patterson, Taft, Truman, Jas. McManus, Harroun, Barrett, T. T. Moore, Crawford, and discussion closed by A. W. Harlan.

Section IV was called. Frank Abbott, Chairman, reported that there was one paper, to be read by C. W. Stainton, of Buffalo, N. Y.

Dr. Stainton then read his paper, entitled "Crownless Teeth."

Discussed by Drs. Abbott, Peirce, Morgan, A. O. Hunt, Carroll, Barrett, Morrison, Patrick, J. Head, and Guilford. Discussion closed by Dr. Stainton, and subject passed.

The Committee on Credentials made a report of progress, which was adopted.

The Auditing Committee reported progress, and asked for further time.

The following resolution, offered by Dr. W. W. Walker, was adopted:

Resolved, That at all future meetings of this Association no dental exhibits of any kind be allowed near the place of meeting.

The report of the Committee on Revision of the Constitution was ordered published.

Several announcements were made by the President.

On motion, adjourned to 7.30 P.M.

THIRD DAY—EVENING SESSION.

The Association was called to order at 8.10 P.M., the President, Dr. Walker, in the chair.

The minutes were then read and approved.

Section VI was then called, and Dr. H. A. Smith, its Chairman, reported that Dr. J. J. R. Patrick would read a report, and Dr. J. D. Patterson a paper on "The Effect upon the Tissues of the Oral Cavity produced by the Internal Administration of Certain Drugs."

Dr. Patterson then read his paper.

Discussed by Drs. W. W. Coon, Fillebrown, Morgan, Kirk, H. A. Smith, G. E. Hunt, Gramm, Horton, Cravens, Barrett, and Patterson, and the subject was passed.

Dr. Patrick then read his "Second Annual Report of the Examination of Human Crania in Public and Private Museums."

Discussed by Drs. Peirce, H. A. Smith, and Ottofy.

The subject was passed.

Dr. Kirk, Chairman of the Committee on State and Local Organizations, stated that the Committee had held a meeting, and in pursuance of the suggestions embodied in the President's address begged to submit the following list of questions for the approval of the Association.

[Questions will be found after the report of the Committee on the President's address.]

Dr. Smith moved that the report be received; seconded by Dr. Horton.

Motion put and carried.

Dr. Kirk then moved that the list of questions as read be issued to the local societies in accordance with the plan proposed and by authority of the American Dental Association.

Seconded and carried.

On motion, adjourned to 9 A.M. Friday.

FOURTH DAY—MORNING SESSION.

The Association was called to order at 9.45 A.M., the President, Dr. Walker, in the chair.

The minutes of the last session were read and approved.

The Secretary *pro tem.* then read the list of members of Sections.

On motion of Dr. Crouse, the Association listened to Dr. John B. Rich, who gave an account of the status of dentists *re* the Census Bureau.

SKETCH OF THE ACTION OF THE DENTISTS IN RELATION TO THE H. R. BILL NO. 7696 OF THIS CONGRESS, KNOWN AS THE "*WILLCOX BILL.*"

At the annual meeting of the Maryland State Dental Society, in the early part of May, the attention of the society was called to the fact that a bill prepared by the Census Bureau had been introduced in the House of Representatives by Mr. Willcox, which gives the Secretary of the Interior and his subordinates in the Census Bureau the authority to include dentists in the schedule of manufacturers, and compel them under severe and unprecedented penalties to give detailed statements of their entire business. Upon a careful inspection of this bill, it became apparent that it was a most outrageous attempt on the part of the Census Bureau to establish a legal inquisition over whomsoever they pleased. And as the Census Bureau had already issued to and demanded from the dental profession correct answers to the schedule issued to manufacturers, which many dentists had refused to answer, it was very evident that the menace which had been made to several dentists by Census Bureau officials when they declined to answer, to the effect "that they would soon be able to punish those who refused to answer the questions propounded to them," meant something, and had not been a mere idle threat.

Under this view, the society resolved to resist this action of the Census Bureau, which appeared to be specially directed against dentists. They therefore by resolution appointed a Committee to attend to this matter, and the following gentlemen were named as such Committee: R. B. Winder, Sr., chairman; Ed. Nelson, T. S. Waters, A. J. Volck, W. A. Mills, David Genese, and W. S. Twilley. The society instructed this Committee to use every means possible to prevent the passage of this bill in its present objectionable form, and endeavor to have it so modified that it could not be applied to dentists. They also instructed them to confer with the other State Dental Societies, and endeavor to have them appoint committees to co-operate in producing the desired result.

This Committee entered on its duties at once with great zeal, and placed itself in communication with the members of Congress of their own State. They also immediately had a large number of copies of the objectionable bill printed with the objectionable parts underscored, which together with a vigorously written circular they forwarded to every dentist in their State, urging them to use all the influence they could command upon Congress to prevent the passage of this bill. The chairman, Dr. Winder, also prepared an exhaustive argument against the action of the Census Bureau in classifying dentists as manufacturers, when their calling is universally recognized as a

liberal profession. A copy of this argument was sent to all the members of Congress, and generally read by them, and, as the result proved, was largely instrumental in educating them as regards the proper status of the dental profession.

The chairman of this Committee, Dr. Winder, then personally laid this matter before all the State Dental Societies he could reach, and communicated with those he could not attend in person. As the result of his exertions, the State Societies of Connecticut, New York, New Jersey, Pennsylvania, Maryland, North Carolina, and the District of Columbia appointed committees to attend to this matter. These committees met in Washington, and agreed to organize under the name of "The Associated Committees of the Dental Societies," and work together for the object for which they were appointed. They elected John B. Rich, M.D., D.D.S., as chairman of this body. By the time this organization of the Associated Committees was completed, the bill had passed the House and was in the hands of the Senate Committee on the Census. The Associated Committees then adopted the following as an amendment to this bill, to be inserted directly after the word "year" in the twenty-eighth line in H. R. Bill No. 7696 of this session of Congress: "*Provided that nothing in this act shall be construed as authority to collect statistics from professional men, such as lawyers, physicians, and dentists.*" They directed their chairman, Dr. Rich, to ask for a hearing before the Senate Committee on the Census, in relation to having this amendment introduced in this bill before it was reported complete to the Senate for its action; and if this application for a hearing was granted, to present the case on behalf of the dentists, and endeavor to have the amendment introduced in the bill, and notify the members of this Committee of the time appointed for the hearing, so that as many as could might be present and make as large a delegation as possible.

Dr. Rich at once applied to the chairman of the Committee on the Census, the Hon. Eugene Hale, for a hearing in relation to having the amendment that had been agreed upon introduced in the bill. This was accorded to him, and the 27th of June named as the day. In the mean time the chairman had written and sent to the different Committees a circular for distribution throughout their States, accompanied by copies of the amendment which had been agreed upon. This circular urged upon the dentists throughout the country the importance of immediate action as regards the endeavor to bring all the influence possible upon Congress, and particularly upon the Senate, to have the amendment introduced in the bill before it left the Committee on the Census. Dr. Rich busied himself in every way that he thought would be available to defeat this bill in case the Committee could not be influenced in favor of the amendment, or be disposed to assist the Committee to make some arrangement with the Census Bureau that would be satisfactory to our profession. In this endeavor he was more successful than he had hoped. A Republican Senator to whom he presented our case became very much interested in our behalf, and promised that if the bill should be reported to the Senate without the amendment added to it that we had presented, or in lieu of it we had not been able to make a satisfactory arrangement with the Census Bureau, he would move to have it referred to the Judiciary Committee

on the ground of its being unconstitutional. He also procured the assurance of several Republican and a large number of Democratic Senators that they would support and advocate such a motion if it were made.

There were present at the hearing Drs. R. B. Winder, Wm. A. Mills, and W. S. Twilley, of Baltimore; Dr. J. D. Thomas, of Philadelphia; Drs. Chas. A. Meeker and F. C. Barlow, of New Jersey; and Drs. H. B. Noble and John B. Rich, of the District of Columbia.

Dr. Rich presented the case for the dentists, stating the objections they had to the action of the Census Bureau in classifying them as manufacturers, and to this bill as it affected them under that classification, and urged the insertion of the amendment we had presented. Dr. J. D. Thomas, of Philadelphia, and Dr. W. S. Twilley, of Baltimore, also made some remarks explaining why the dentists objected to the existing classification.

Superintendent Porter then endeavored to show that he had not attempted to collect the statistics of anything but mechanical dentistry, and tried to defend his course in doing that. He then introduced his superintendent of manufacturers, and his statements were in the same strain. Then followed some argument on our side, and the Committee asked a number of questions in relation to the matter, and as this went on it became very evident that the Committee favored our views. Superintendent Porter was not slow to perceive this, and as he did not want the amendment added to the bill, as that would send it back to the House, he backed square down from the position he had taken, and said he did not wish to do anything that would place the dentists in a false position, and if what he had done had had that effect he would take them out of the classification they complained of.

In answer to Superintendent Porter, Dr. Rich said that if the superintendent would agree, over his own signature, to carry out the spirit and purpose of the amendment we had asked to have introduced in the bill, to the effect that dentists should not be called upon to furnish any statistics or information of any kind in relation to their business, the dentists would be satisfied with such assurance, instead of having the amendment introduced into the bill. He agreed to this, and said that if Dr. Rich would come to his (the superintendent's) office, the matter could be arranged to the satisfaction of the dentists. Dr. Rich objected to this course, and insisted that the matter should be arranged at once, in the presence of the Committee on the Census, as we understood the agreement. He then stated to the Committee his understanding of the promise the superintendent had made, and was assured by the Committee that their understanding of it was the same as his. He then requested the clerk of the Committee on the Census to draw up the agreement, which he did. Superintendent Porter signed it, and on behalf of the Committees he represented, Dr. Rich withdrew their objections to the bill. He then went to the Senate Chamber and informed those who had agreed to act for the dentists that the matter had been satisfactorily arranged, and they need not oppose the bill on our account.

So that the Associated Committees beg leave to report that they were successful in their resistance to this iniquitous proceeding of the Superintendent of the Census.

This agreement remains in the possession of Dr. Rich, to be disposed of as the American Dental Association shall direct. The Associated Committees respectfully suggest that copies of it should be distributed all over the country. Every dentist ought to have one, so that they may know what has been done for them. As they have given this matter some thought, they would further suggest that this sketch and the objectionable bill, with the amendment proposed (which became the basis of the agreement) and the agreement with Superintendent Porter, be printed in a circular of four pages.

The Committee have had some estimates made of the cost of such a circular, with the following results: For 10,000 copies the price would be $48.00, on good paper.

All of which is respectfully submitted.

On motion of Dr. Shepard, the report was referred to the Publication Committee.

Dr. Shepard then offered the following resolutions, which were unanimously adopted:

WHEREAS, Under a classification of dentists as manufacturers by the Census Bureau many members of the profession have made returns according to said classification; and

WHEREAS, Said classification was the subject of a protest by the dental profession at large, resulting in the following proposed amendment to the House Bill No. 7696, known as the Willcox Bill:

"*Provided*, That nothing in this act shall be construed as authority to collect statistics from professional men, such as lawyers, physicians, and dentists"; and

WHEREAS, As the result of a conference between the representatives of the dental profession and the Committee on the Census of the United States Senate and the Hon. Robert P. Porter, Superintendent of the Census, an agreement was made that if the Committees representing the interests of the dental profession would withdraw the said amendment to the Willcox Bill, he —the Superintendent of the Census—would carry out the spirit of the provisions of the proposed amendment, in accordance with the following agreement:

"The Superintendent of the Census agrees with representatives of the Dental Associations present, at a meeting of the Senate Committee on the Census, to carry out the spirit and purpose of the amendment presented by the said Associations at the meeting, and which appears in the paper marked 'A' hereto attached. ROBERT P. PORTER."

Signed June 27, 1892.

Resolved, That the American Dental Association recommends its members and the members of all societies affiliated with it, who have made returns under the foregoing named classification, to forward to the Hon. Robert P.

Porter a request to return to the writer his statement made to the Census enumerator, so that said statement shall cease to be a matter of record in the Census Office, for the accomplishment of the spirit and intent of the agreement, as noted.

Resolved, That a copy of the foregoing be forwarded to the Hon. Robert P. Porter, Superintendent of the Census, Washington, D. C.

Resolved, That this Association hereby expresses its appreciation of the promptness and public spirit of the Maryland State Dental Society, the New Jersey State Dental Society, the Odontological Society of Pennsylvania, and other societies, in attending to this important matter for the benefit of the whole profession.

Resolved, That our thanks are tendered to Dr. John B. Rich for his valuable assistance, and that an order be drawn upon the Treasurer to reimburse Dr. Rich for expenses incurred, as per memorandum submitted by him.

Resolved, That full power be given to the Executive Committee of this Association to act for the Association in this matter in the interim between this meeting and the meeting of 1893.

Dr. Rich tendered the original agreement made between a committee of dentists representing the profession *re* census classification and Superintendent Porter.

Dr. Shepard moved that the tender be accepted.

Dr. Allport moved that the Secretary of the Association keep the agreement in a safe place, and furnish a certified copy of the document for the use of Dr. J. B. Rich. Carried.

Dr. Shepard moved that Dr. Rich be appointed a committee of one, to act in conjunction with the Executive Committee, to whom the whole matter had been referred. Carried.

Dr. H. A. Smith moved to reconsider the vote on excluding exhibits from the neighborhood of the hall of meeting. Discussed by Drs. Crouse, Barrett, Allport, Watkins, and Darby.

The reconsideration was ordered.

On motion, the original resolution as offered by Dr. Walker was laid on the table.

The Committee on Necrology reported.

The report was adopted by a rising vote. It will be found in the Memorial pages.

Dr. Harlan offered the following :

Resolved, That we tender our thanks to such of the railroads as have made reduced rates for the members in attending this meeting, and also to the local Committee of Arrangements for their attention to the wants of members while in Niagara Falls, especially to Dr. M. O. Cooley, chairman.

Carried.

The Committee on Credentials presented its final report, which was adopted.

Dr. H. A. Smith moved that the janitor be paid ten dollars. Carried.

The Auditing Committee reported that the accounts of the Treasurer and Publication Committee were correct.

The hour having arrived for the election of officers, the Association proceeded with that business, with the following result:

President, J. D. Patterson, Kansas City, Mo.
First Vice-President, J. Y. Crawford, Nashville, Tenn.
Second Vice-President, S. C. G. Watkins, Mont Clair, N. J.
Corresponding Secretary, F. A. Levy, Orange, N. J.
Recording Secretary, Geo. H. Cushing, Chicago, Ill.
Treasurer, A. H. Fuller, St. Louis, Mo.
Executive Committee (for three years), W. W. Walker, S. G. Perry, and D. N. McQuillen.

The minutes were then read and approved.

The newly elected officers were then installed.

Drs. J. D. Thomas and D. N. McQuillen conducted the President to the chair, who, on assuming the duties of the office, made a few appropriate remarks.

Dr. J. Y. Crawford then ascended the platform, and made brief remarks accepting the office of First Vice-President.

The President appointed on the Publication Committee, A. W. Harlan and E. T. Darby.

The minutes were then read and approved, and the Association adjourned to meet in Chicago the second Tuesday in August, 1893.

A. W. HARLAN, *Secretary pro tem.*

IN MEMORIAM.

DR. JOHN ALLEN.

In the dispensations of an all-wise and overruling Providence, Dr. John Allen, of New York, on the 8th day of March, 1892, at the age of eighty-two, passed from this to a higher and brighter life, having attained a fullness and ripeness of age beyond that of the common lot of men.

Dr. Allen stood as a representative man in the profession of his choice.

In the line to which he gave special attention he was the chief, and was so recognized,—not only in this, but in all the countries of the world where prosthetic dentistry is known and practiced. He it was who brought to its present high state of perfection that variety of substitutes known as continuous-gum dentures.

Though his chief attention and labor were devoted to this special work, he was interested and took part in the various lines of thought and effort that were employed for the development, growth, and establishment of dental science and art. He was ever ready to defend and sought to elevate the profession to a higher plane of usefulness.

Dr. Allen was one of the organizers of the Ohio College of Dental Surgery, and a professor and an efficient teacher in that institution.

In the subject of dental education he always manifested a warm interest. A writer of more than ordinary ability, he added many valuable contributions to the literature of the profession.

He was an active member of this Association from almost the time of its organization, and did much to promote its welfare. He was also a member of, and an active worker in, a number of other dental societies.

Dr. Allen was a man of purest character and highest integrity,—one not only respected, but beloved by all who knew him; in manner most affable, in bearing dignified, in spirit gentle and sympathetic.

The loss of such a one is always an occasion of sadness and sorrow; but we have the consolation of the knowledge that his career was rounded, full, and complete, and his death closed a life filled with good works for his fellow-men.

In view of the above,—

Resolved, That we will ever cherish the memory of our departed brother, and seek to establish and perpetuate the high principles that were so fully illustrated in his noble life.

Resolved, That the traits so preëminently characterizing the life of him we now commemorate are worthy not only of our high regard, but most earnest emulation.

Resolved, That this testimonial be placed on a memorial page of the Transactions of this body, and a copy, properly engrossed, be sent to the family of the deceased; also, that a copy be sent to the dental journals of this and other countries for publication.

CHARLES A. KINGSBURY, M.D., D.D.S.

Within the last year Dr. Charles A. Kingsbury was called from this to a higher life, in the seventy-second year of his age.

Dr. Kingsbury many years ago became identified with this Association, and retained his membership to the time of his death; and though he was not always present at its meetings, so highly was he esteemed by the membership of the body that it was a pleasure to all to have his name upon the roll of members.

Dr. Kingsbury entered the practice of the profession in 1839, in Philadelphia, and continued actively engaged in its pursuit during his life. He studied dentistry in Trenton, N. J.; he was intimately acquainted with the leading men of the profession almost the whole of his professional career, and imbibed in a large measure the interest and enthusiasm of those men for dental science and art,—indeed, that association, in a degree, shaped his professional life. He was familiar with all things that entered into the development and progress of dentistry for about fifty years. He was a man of liberal learning and broad culture,—one whose sociability was a predominant characteristic. In his early life he was a teacher, and after many years' practice of his profession he was for a time a successful teacher in one of the dental colleges in the city of his home. He was highly esteemed by all who knew him. He was a man of sterling characteristics,—genial, kind, and sympathetic in his association with his fellows. In his death, not only this Association, but the entire profession, loses another of the pioneers who was ever devoted to its interests, ever contributing of his resources to its upbuilding.

Resolved, That we will ever cherish the memory of our departed brother as one whom we delight to honor and to emulate in his leading characteristics.

Resolved, That this statement and resolution be placed upon the memorial page of the proceedings of this body, that a copy in proper form be transmitted by the Secretary to the family of the deceased, and that it be sent to the journals for publication.

REPORT OF COMMITTEE ON REVISION OF THE CONSTITUTION.

THE report as herewith printed shows the stage of the work of the Committee on the Revision of the Constitution at the time it was decided to postpone consideration until 1893. The Committee had met and, taking up the report as printed in the Transactions for 1891, had proceeded so far in perfecting their work as to strike out the alternate readings and second choice amendments, etc., retaining only what they were agreed upon. On postponement of consideration being ordered, they turned over the papers to the Secretary without formally presenting a report or making any recommendations. Those interested in the proposed changes can compare the report as here printed with that of the Transactions for 1891. The amendments are in *italics*.—PUB. COM.

CONSTITUTION.

ARTICLE I.

NAME.

This organization shall be known by the name of the American Dental Association.

ARTICLE II.

OBJECTS.

The object of this Association shall be to cultivate the science and art of dentistry and all its collateral branches, to elevate and sustain the professional character of dentists, to promote among them mutual improvement, social intercourse and good feeling, and collectively to represent and have cognizance of the common interests of the dental profession.

ARTICLE III.

MEMBERSHIP. NUMBER OF DELEGATES FROM LOCAL SOCIETIES.

SECTION 1. Each local society may send one for every five of its active members, and each dental college one from its Faculty, as delegates to this Association for one year, upon complying with the requirements of its Constitution; but no society shall be entitled to representation that does not adopt or substantially recognize its Code of Ethics. *Nor shall any dental college be*

represented that does not comply with the course of instruction adopted by the National Association of Dental College Faculties.

EXPELLED MEMBERS.

SEC. 2. Any member of this Association being expelled or suspended from his local society, shall from that date cease to be a member of this body.

MEMBERS TO BE OF THREE CLASSES.

Sec. 3. The members of this Association shall be of three classes, viz: delegates, permanent and honorary members; the two former classes having equal rights and privileges, except that none but permanent members shall be eligible to office. Honorary members shall consist of prominent, worthy members of the dental profession residing in foreign countries, who shall be elected by ballot.

DELEGATES.

SEC. 4. All delegates shall be practitioners of dentistry; they shall receive their appointment only from permanently organized dental societies and dental colleges, having definite conditions of membership other than pecuniary, which shall have been approved by the Executive Committee [*Council*], and a copy of which shall be in the hands of the Recording Secretary of this body.

This Association will receive no delegates who, since August, 1875, shall have entered the profession without having first graduated at some reputable dental or medical college.

PERMANENT MEMBERS.

SEC. 5. Permanent members shall consist of those who, having served one year as delegates and complied with the requirements of the Association, shall sign a statement in the book to be kept for that purpose, signifying to the Treasurer a desire for permanent membership. After the resignation of a member has been accepted, the Association may, at any time thereafter, reinstate such member by unanimous consent.

SIGNING CONSTITUTION.

SEC. 6. Each new member, before voting or speaking on any subject before the meeting, shall sign these regulations, inscribing his name and the title and location of the institution from which he receives his appointment.

DUES.

SEC. 7. Five dollars shall be paid to the Treasurer by each member yearly, as dues, before he can be eligible to office, or to speak or vote on any subject before the Association; and in case the dues remain unpaid at the close of the second annual meeting thereafter, the name of any such delinquent shall be erased from the list of members without further action. *But any member of the dental profession who has been in reputable practice for a period of fifty years may be elected to permanent membership without the payment of dues; and any member who has been in practice for a like period shall have his dues remitted thereafter by presenting the fact to the Treasurer of the Association.*

GIVING NAME ON RISING.

SEC. 8. No one shall be permitted to address the Association before giving his name and residence, which shall be distinctly announced from the chair; nor shall he speak more than twice, nor longer than fifteen minutes in all, unless by consent of the Association.

CONDUCT OF MEMBERS.

SEC. 9. Any act of special immorality or unprofessional conduct committed by a member of this Association shall be referred to the Executive [*Council*], whose duty it shall be to thoroughly examine into the case, and report at the next meeting if the charges be sustained. Whereupon, by a vote, the offending member may be reprimanded or expelled, a two-thirds vote being required for expulsion, a majority being sufficient for reprimand.

ARTICLE IV.

TIME AND PLACE OF MEETINGS.

The regular meetings of the Association shall be held annually. The time and place of meeting shall be determined each year by vote of the Association. After the selection of a place of meeting, there shall be appointed by the President, annually, a committee of three, residing at or near the place selected for the next meeting, whose duty it shall be to procure rooms for meetings and clinics, and to make such other local arrangements as may be needed for the Association. This Committee shall act under the direction of the Executive Council.

ARTICLE V.

OFFICERS.

SECTION 1. *The officers of this Association shall be a President, two Vice-Presidents, Corresponding Secretary, Recording Secretary, Treasurer, and an Executive Council.*

The Executive Council shall be the Business Committee of the Association, and shall consist of twelve active members, of which the President, Secretary, and Treasurer of the Association shall constitute a part, and these shall be the officers of the Executive Council, which shall be competent to provide rules for its own government.

PRESIDENT—DUTIES OF.

SEC. 2. The President shall preside according to parliamentary usage, as laid down in "Cushing's Manual" and the Rules of Order adopted by this Association.

VICE-PRESIDENTS—DUTIES OF.

SEC. 3. In the absence of the President, one of the Vice-Presidents shall perform the duties of the office, and in the absence of these officers a chairman *pro tem.* shall be appointed by the Executive Committee [*Council*].

CORRESPONDING SECRETARY—DUTIES OF.

SEC. 4. The Corresponding Secretary shall attend to the correspondence of the Association with the societies therein represented, and to correspondence with other scientific bodies as may be desirable.

RECORDING SECRETARY—DUTIES OF.

SEC. 5. The Recording Secretary shall keep accurate minutes of the proceedings of the Association, preserve the archives and unpublished documents, and attend to the other duties that pertain to his office. He shall be *ex officio* chairman of the Publication Committee, and shall see that due notice is given of the time and place of the meetings of the Association.

ELECTIONS.

SEC. 6. *All officers of the Association shall be elected by ballot without nomination. The three names, or in case of a tie, the four names having the greatest number of votes, shall be the sole nominees in case of failure to elect on the first ballot, and a majority of all the votes cast for those names shall be necessary to a choice.*

Each officer, except as otherwise provided, shall hold his appointment for one year, or until another is elected to succeed him.

TERMS OF OFFICE.

SEC. 7. *The terms of office of President, Vice-Presidents, Corresponding Secretary, Recording Secretary, and Treasurer shall be one year, or until their successors shall have been elected and installed. That of members of the Executive Council shall be three years, and their terms of office shall be so arranged as that three of them shall expire each year. The present members of the Executive Committee shall be members of the Executive Council.*

QUORUM OF EXECUTIVE COUNCIL.

Seven members of the Executive Council shall constitute a quorum. If at any annual meeting a quorum shall not be in attendance, the members of the Council present shall appoint enough members of the Association who are present to constitute a quorum, and such members so appointed shall serve until the arrival of the regular members of the Council in whose places they were appointed.

REGULAR AND SPECIAL SESSIONS.

SEC. 8. *The regular sessions of the Association shall be held in the morning and the evening. No business aside from that of the reading of papers, the reports of officers and Standing Committees, and the discussion of scientific and professional subjects shall be introduced at the regular sessions.*

Upon the afternoon of the third day of the annual meeting, a special session shall be held for the election of officers, the fixing of a time and place for the next annual meeting, and the transaction of such other business as may be necessary or expedient.

Special sessions may be called by the Executive Council upon any other day of the meeting, for the transaction of business.

PUBLICATION COMMITTEE.

SEC. 9. *The Recording Secretary, in conjunction with the Chairman and Secretary of the General Committee of Work, shall form the Publication Committee of the society. This Committee shall be authorized to employ a competent reporter to furnish an accurate report of the proceedings of each meeting.*

The Committee shall superintend the publication and distribution of such portions of the Transactions as the Association may direct, or the Committee

may deem of sufficient value, and also of such abstracts of papers in advance of the meetings as shall be referred to them for that purpose by the Supervisory Committee of Work.

They shall specify in the annual report which they shall present to the Association, the character and cost of the publications of the Association during the year, and the number of copies still on hand. Any report or other paper to be entitled to publication in the volume of Transactions for the year in which it shall be presented to the Association must be in the hands of the Publication Committee on or before the first day of September, and must be so prepared that the proof-sheets furnished the author shall be returned to the Committee without material alteration or addition.

Every paper received by the Association, and all plates or other means of illustration, shall be considered the exclusive property of the Association, and shall be published for its benefit.

COMMITTEE ON NECROLOGY.

SEC. 10. *The President shall appoint annually a Standing Committee on Necrology, to consist of five members, whose duty it shall be to act, without further instructions from the Association, and report the list of deaths of members with such biographical sketches as they may think proper.*

ARTICLE VI.

SUPERVISORY COMMITTEE.

SECTION 1. *The Executive Council, before the close of each meeting, shall appoint a Supervisory Committee of Work, consisting of five members, to whom shall be referred all papers of a professional and scientific nature, and all appliances and improvements in dentistry. Such papers, with a full account and description of such appliances and inventions, if a full discussion of their merits is desired, shall be in the hands of such general committee at least thirty days before the time for the annual meeting. The committee may, in their discretion, prepare an abstract of such papers and have it printed and forwarded to each member of the committees of the Sections, and to such other members of the Association as they shall deem proper, at least ten days before the time for the annual meeting.*

All papers, appliances and improvements, models, or illustrations of devices that may be received by the Supervisory Committee of Work, if approved by them, shall be referred to the appropriate Section committee for presentation in the regular report. The members of this committee shall hold no other office in the Association.

The terms of office of the members of such committee shall be five years, and they shall be so arranged that one shall go out each year. The senior member shall be Chairman of the committee, and the next in seniority shall be the Secretary.

In case any member of such committee shall be unable properly to discharge the duties of his position, by reason of removal from the country, sickness, or any other sufficient cause, or if there be a persistent neglect of such duties, the Executive Council at any regular meeting may declare a vacancy, and proceed to fill it by the appointment of another member.

SECTIONS.

SEC. 2. *To further expedite the scientific work of the Association, the Executive Council shall appoint a committee of three for each of the following Sections:*

1. *Prosthetic Dentistry, Metallurgy, and Chemistry.*
2. *Dental Education, Literature, and Nomenclature.*
3. *Operative Dentistry.*
4. *Histology and Microscopy.*
5. *Materia Medica and Therapeutics.*
6. *Physiology and Etiology.*
7. *Anatomy, Pathology, and Surgery.*

The terms of office of the members of such committee shall be three years, and they shall be so arranged that one shall expire each year. The senior member shall be the Chairman, and the next in seniority the Secretary of such committee.

The committees so appointed and organized shall have charge of the work in their several Sections, and shall submit at each annual meeting a report comprising a full account of the status, advancement, and improvements made in their respective fields, and also such papers, or parts of papers, as shall have been referred to them by the Supervisory Committee of Work.

Vacancies in such committee may be declared and filled by the Executive Council, for the reasons and in the manner prescribed in Section 1 of this Article.

SEC. 3. *It shall be the duty of each member to identify himself with one or more of the above Sections, and he shall inform the Recording Secretary of his choice at the time of joining the Association. In case such notification be not duly made, it shall be the duty of the Recording Secretary to assign such member to any Section which he may think proper.*

The reports of Sections shall be called by the President in consecutive order, beginning each succeeding year one number higher than on the preceding year.

SEC. 4. *The Sections and the General Committee are prohibited from inviting persons who are living in violation of the Code of Ethics to give clinics, read papers, or give exhibitions before the Association.*

SEC. 5. For the information of all members, a list of the members of each Section shall be published in the Transactions of each year.

ARTICLE VII.

QUORUM.

Fifteen members shall constitute a quorum for the transaction of business in this Association.

ARTICLE VIII.

SUSPENSION OF RULES. THREE-FOURTHS TO VOTE.

The regular order of business may be temporarily suspended by a three-fourths vote of all the members present, for the consideration of a specific subject, upon the completion of which the regular order shall be at once resumed.

ANNUAL ADDRESS.

By W. W. WALKER, President.

GENTLEMEN OF THE AMERICAN DENTAL ASSOCIATION,— For the thirty-second time this Association convenes in annual session, for the purpose of mutual greeting and such interchange of views, after another year of practical experience and study in and of our profession, as will tend in the highest degree to promote the present and future welfare of the Association and of its individual members. A study of the growth of science as applied to our profession in the past is a subject full of interest and importance, which, in its advancement, is marked by signal, if not unanticipated, success.

While I have but one or two special subjects to which I feel called upon to specifically direct your attention, it is proper, I think, that I should congratulate you upon the progress and high rank American dentistry has attained through the combined efforts of the members of this Association. You will all admit that, in our practice, operations are being performed almost daily with entire certainty and success which, at the birth of this Association, would have been considered quite impossible. But, while this is true, it is also true, judging the future by the past, that there yet remains a wide field for successful experiment and practical application, in which and by which science, as the chief handmaid of our profession, shall yield results equaling, if not indeed surpassing, the achievements hitherto attained.

The student of dentistry to-day, starting with the accumulated experience of the past and the better knowledge of applied science resulting from the achievements of those older in the profession, has a decided advantage, and as a consequence should be able to add materially to the accumulated store of applied knowledge. If there is one use above another for the existence of our Association, it surely is that by its influence professional skill and studious development

may be in the highest degree promoted. That such has been the result in a signal measure hitherto, I think you will all admit.

It is not my purpose to detain you by length of speech, nor is it needful that I should do so; and I shall, therefore, without any further preliminaries, take up such practical matters as I think it is proper I should submit for your consideration at this time.

The World's Columbian Dental Congress.

We are all aware of the joint action of the Southern and American Dental Associations, which created an Executive Committee of fifteen, clothed with full power to take such action as in its judgment it should deem best to carry out the objects of its organization, such action to be final and binding. The object had in view by the two great representative dental bodies of the United States authorizing and inaugurating the movement for holding the World's Columbian Dental Congress, from August 17 to August 27, 1893, was the bringing together, for professional, scientific, and social purposes, of the dentists of the United States and other countries; and it is the desire, as it will be the effort, of your Committee to so justify the trust reposed in it that this contemplated Congress shall prove a brilliant and long-to-be-remembered success. We start pledged to do whatever may be in our power to make the occasion contribute notably to the elevation of the profession, to stimulate the spirit of research, to strengthen fraternal courtesy, and promote cordial co-operation throughout the world among all who desire the advancement of dental science and art. The aim would be too limited if it included less than this, and the enterprise will be a failure if it falls short of a realization of this ambition.

It is the first time in the history of American dentistry that we have had an opportunity of demonstrating to the whole world what has been accomplished in all departments by American dentists in the last half-century, and it behooves each and every one of us to put forth our best efforts to prove to the world at large that we are justly entitled to the proud position we claim and occupy,—the topmost round of the ladder.

All reputable dentists are cordially invited to participate in this Congress, and there is reason to believe that the invitation will be accepted by large numbers. We expect the presence of distinguished representative dentists from almost every civilized country, including nearly all of note in our own,—in one word, the largest gathering of dental practitioners in the history of our profession.

To accomplish this vast work, a considerable sum of money will be needed. The General Finance Committee, which consists of Drs. L. D. Shepard, A. L. Northrop, and Truman W. Brophy, after careful estimates, place the amount to be contributed in advance of the Congress at $30,000; so you may imagine the magnitude of the work to be done by the twenty-three Committees under the Executive Committee. It is expected that on this occasion there will be no laggards, but that all members of our profession, realizing the personal nature of this obligation to the cause of professional advancement, will not only become members of this Congress, but will contribute promptly and as liberally as their purses will allow.

DENTAL EDUCATION, LEGISLATION, AND THE DENTAL DEGREE.

With so many different colleges in the United States, most of them recognized as reputable, and about the same number of State Examining Boards, or Boards of Censors, as they are termed in some States, all working presumably for the welfare, advancement, elevation, and harmony of the dental profession, I feel justified, after a recent personal experience, in bringing these matters before this Association for consideration, and, if deemed expedient, for some kind of action.

As the laws stand to-day, students can enter any of the dental colleges with a certificate from a grammar school, or after passing a preliminary examination in branches prescribed by the National Association of Dental Faculties, and there pursue a curriculum extending over three years, the annual terms consisting of from five to nine months, before passing the prescribed final examinations. Now it would seem reasonable that a graduate from any reputable college, with a degree granted after he had fulfilled all these requirements, should be allowed to practice his profession in any State of the Union, without being put through the humiliation of another examination.

If the growing tendency toward dissociating the teaching function from the examining and licensing function should become the rule, whereby college faculties shall be concerned solely with the educational training of students, while the work of examining and licensing shall be relegated to properly constituted and trustworthy State Boards of Examiners, there could be no valid excuse for the lack of inter-state comity in the matter of mutually recognizing State standards of dental education.

We should have more confidence in our fellow-men, and not degrade ourselves with suspicions of any lack of integrity on the part

of the personal staff or faculty of a properly conducted and reputable college.

We must remember that the gentlemen comprising such faculties are among the most honored members of our profession, who have worked with diligence and zeal to assist in making it what it is to-day. I will grant you that up to within a few years the faculties of our dental schools may in some instances have been a trifle more lenient with students than they should have been, and some were sent out into the world perhaps not quite up to the standard; but with the new dental college regulations which have gone into effect we have a new order of things, and active legislation tending to a harmonization of the standards of the various State Examining Boards, so that the certificate of each shall secure to the holder of it unrestricted license to practice in all the other States, is a question which immediately concerns us at this time, and is respectfully submitted for your action.

There is and has been too much clashing and slashing going on between schools and different State Boards. This should be stopped, and I desire to recommend a plan which will afford a remedy. In an annual address before the Dental Society of the State of New York, delivered in May, 1891, I made the following suggestion: I have learned from reliable authority that several of our prominent colleges are willing that their candidates for graduation shall be examined by their respective State Boards, at the same time that the faculty examinations take place, and where the candidate has passed both bodies satisfactorily, that the usual diploma shall be conferred, countersigned by the proper officers of the State Examining Board. I will say that these gentlemen are of the same opinion to-day, and that the Dental Department of the University of Buffalo wish to graduate their students in this manner.

In all States where dental colleges exist, this plan should be adopted. I think all States should be divided into districts, each possibly with its corresponding District Society, and each District Society should have a board of examiners; and in the State Board each district should be represented by one examiner from the district organization recommended to the State Society by the said district, and all State Boards so constituted by this system should be elected by the dentists of the State, and never appointed by the governor.

A National Board of Examiners is probably not necessary; but if the need should arise, such a board could easily be created under the scheme here proposed, and when so created should act only as a final

court of appeal to have jurisdiction over questions involving lack of harmony in inter-state relations concerning matters of examinations, licenses, etc., and formulate plans tending to uniformity in matters of ethics, legislation, and education throughout the United States.

Committee on State and Local Organizations.

The question of some practical method by which the members of the dental profession throughout the United States can be more definitely organized, and a closer relationship established between the American Dental Association and the various State and local organizations of this country, is one deserving of especial consideration by this body at this time. The best interests of American dentistry demand a more intimate and closely knit organization of its best working forces, to the end that better work in all departments may be done, and especially is this necessary with reference to the showing we are to make at the coming World's Columbian Dental Congress.

A plan which has been suggested editorially in recent issues of the *Dental Cosmos* offers advantages which seem worthy of careful consideration, and as the details are probably familiar to you, or if not, are easily accessible, it is only necessary for me to give a brief outline of the suggestions there made.

It is proposed to emphasize the Section work of the American Dental Association by making each Section a repository of the results accomplished throughout the Union in its given department, to the end that the annual report of the Association shall truly represent the progress of dentistry during the previous year. As a foundation for the accomplishment of this purpose, it is suggested that a series of questions, carefully chosen as to importance and suggestiveness, though few in number, be formulated by this body, and circular-letter copies be sent to every State and local organization in America, with the request that one or more of the queries shall be taken up as a regular order of business for careful consideration and discussion at each stated meeting of such local organization to which the circular is sent; that a careful and accurate report of the discussion on each topic shall be sent to the Secretary of the American Dental Association, who shall transmit the report to the Chairman of the proper Section, who shall then from all reports so secured collate the data contained therein, and make a careful digest of the same, which shall constitute the basis of his report to the American Dental Association, for discussion by the whole body and publication in its annual report

of transactions. As a part of this plan, each local organization furnishing a report of its discussions shall be requested to send its quota of delegates to represent the said local organization, and intelligently discuss the questions at issue, as embodied in the report of their society when it comes up for action in the American Dental Association. As an inducement toward securing attendance of these delegates, it might perhaps be well to remit the dues for those in attendance the first time.

The plan here proposed is not intended to do away with the plan of work already in operation by the various Sections, which has for its object the securing of valuable original essays and the results of scientific research; but is suggested as an additional plan of work by which it is hoped to secure several valuable factors tending to increase the usefulness and strength of our Association. These are, briefly: first, a more intimate relation and community of interest between the American Dental Association, on the one hand, and the State and local organizations on the other; and, growing out of this, second, the co-operative organization of the entire working force of the dental profession in America; third, the plan proposed will furnish the necessary material as a basis for the active development of the sectional work in this Association, and place the Sections upon a firm basis, so that each will become a sub-organization engaged in special work under the government of the general body, which will then become a truly representative federation of active societies of specialists, and cease to be little more than an expansion of the usual local organization. Not only will its work be in harmony with the dignity of a national body, with a capacity for more and better work, but members in attendance can devote their time and attention to the lines along which they have the greatest interest.

For carrying out the purposes of the proposed plan, I would suggest that a standing committee be appointed, which shall be known as the Committee on State and Local Organizations, whose duty it shall be to secure the co-operation of all State and local organizations throughout the land, transmit the circulars of inquiry annually issued in connection with the plan proposed, and have full charge of all matters which may properly fall within the limit of subjects indicated by its title.

A modification of the plan which I have outlined has recently been carried out with reference to the Dental Association of the State of New York, and at its recent meeting at Albany the report of the correspondent, collated from data received in answer to

a set of queries sent out in circular-letter form, was the subject of much favorable comment, and furnished the basis of a most instructive and satisfactory discussion.

World's Columbian Dental Congress.

A word or two in connection with the next annual meeting of this Association.

If, as is expected, all reputable dentists in the United States shall attend the World's Columbian Dental Congress,—and the committee which you appointed will do the best they can to secure their attendance,—it will certainly be inexpedient, if indeed it will be possible, to hold two meetings so near the same time.

In the first place, the Sections could not get material; and, secondly, we could not secure a full attendance. I would suggest that the next meeting be simply a business one, and that the only business to be transacted shall be the election of officers for 1894 and action upon the report of the special committee to whom was referred the amendment of the constitution and by-laws.

The Executive Committee, chairmen, and members of the different Sections have been working hard to make this year a memorable one in our history, and I sincerely hope that no unnecessary discussion will be presented to take the time which rightfully belongs to the Sections for the completion of their work. I would also suggest that the report of the committee to whom was referred the amendment of the constitution and by-laws be laid over one year, in order, as I have before stated, that the time of the present meeting may be more profitably utilized in the consideration of scientific matters. Under this plan every member of the Association who is interested in its welfare can attend this business meeting next year, and perform his duties as a member of this Association.

BOSTON MEDICAL LIBRARY ASSN. NOV 8 1893

Before bringing my address to a close, I wish to refer to one of our oldest members, deceased during the year just ended, whose life and character call for more than the mere mention of his name.

Dr. John Allen died at his home in Plainfield, New Jersey, March 8, 1892. The dental profession has lost by his death one of its oldest and most worthy members, who long since passed his fifty years of actual practice, and who has stood shoulder to shoulder with representative men in every laudable effort to promote the best interests of the dental profession. Although at the time of his death, I believe, not a member of this Association, in its infancy he was one

of its most earnest and enthusiastic members. I trust that this Association will see that fitting record is made of the services of this distinguished dentist.

Let us, then, proceed to our present duties, not only with all due thankfulness, but with a firm resolution to so improve the opportunities placed within our reach as may most highly benefit the important interests committed to our care.

In order that the many sessions of this Association may be carried on in a business-like and courteous manner, I would suggest that when a person rises to speak, after addressing the Chair, he give his name and address in full. By doing this, you accomplish two things : assist the presiding officer in the discharge of his duties, and the official stenographers of the Association will get your names in their proper places in our Transactions.

Gentlemen, the thirty-second annual meeting of the American Dental Association is open for the transaction of business.

REPORT OF COMMITTEE ON THE PRESIDENT'S ADDRESS.

MR. PRESIDENT: Your Committee to whom was referred the address of the President of this Association beg to submit the following as their report thereon:

First, with reference to the suggestions relating to the World's Columbian Dental Congress at Chicago in 1893, recognizing the importance of the Congress and its joint paternity in the American Dental and Southern Dental Associations, as set forth in the President's address, we recommend that an appropriation of five hundred (500) dollars be made from the funds of the Association to the treasury of the World's Columbian Dental Congress.

In this connection we are pleased to be able to state that at the recent meeting of the Southern Dental Association an appropriation was similarly made for that purpose.

DENTAL EDUCATION, LEGISLATION, AND THE DENTAL DEGREE.

Your Committee fully coincide with the sentiments of appreciation of, and confidence in, the work which is being done for the improvement of dental education by the faculties of a good proportion of our colleges.

The unification of State laws is desirable. Efforts have long been made to secure such unification in matters at the foundation of society, as marriage and divorce, and at the foundation of business, as in insolvency, with results that we need not enlarge upon. We cannot hope to secure uniform dental laws while efforts in more important lines have failed, unless we are willing to level downward rather than level upward. We can hope and expect through means within our own control, especially by the strengthening of the society for each State, that each Board will be of such knowledge and efficiency that its certificate of examination will be respected by the Boards of other States, and either take the place of or modify the obligatory examination. In most States the scope and thoroughness of an examination are entirely within the control of its Board, the only obligation being

that the Board shall be satisfied that the candidate possesses the requisite knowledge and skill to satisfy the State's demand of safety to its citizens.

In reference to the statement in the President's address, that "all States should be divided into districts, each possibly with its corresponding society, and each District Society should have a Board of Examiners, and in the State Board each district should be represented by one examiner from the district organization recommended to the State Society by the said district, and all State Boards so constituted by this system should be elected by the dentists in the State, and never appointed by the governor of the State," we would answer:

The question of the source of appointment to Examining Boards is surrounded with great difficulties. There is no justification for such Boards at all, except under the police powers of the State, and as safeguards for the health of the citizens. The members of Boards are officers of the State, sworn to support the State and faithfully perform their duties as State officials. Their power is derived from the State, and their appointment must be from the State, either directly through the executive or indirectly through the executive or legislature by some delegation of powers. There is no known perfect government, either in its plan or execution. Every good citizen should aim to find out the best, and aid in the evolution of the perfect. The objection to an appointment by the governor is that he is not likely to know the most competent men, or will be swayed by politicians or political motives. Suppose, in any State, the society embraces in its membership every reputable dentist, or ninety or even eighty per cent., would it not be feasible to get the consensus of the views of the members of the State Society as to the proper appointee, and by any method suitable—by vote, by signed petition, or otherwise—recommend to the executive a candidate? Would not an intelligent governor welcome such assistance, and generally be glad to be thus relieved of the responsibility; and would not a political governor, realizing the political power back of such petition represented by the mass of the dentists and their influence with their patients who are voters, consider such an appeal to him as paramount to or vastly greater politically than any similar effort or petition coming from any other source whatever? In this view the objection to lodging the appointing power in the governor ceases to have the magnitude so often affirmed, and besides so placing it furnishes a less complex system of securing a competent Board than the one suggested. We respectfully submit that it is a laudable ambition which all should

share, that by a spirit of conciliation and devotion to the furtherance of a uniformly higher education, matters should be so managed in each State that the State Society should practically embrace the whole reputable profession of the State. This we also regard as the principal factor in securing the best laws and their proper enforcement, the most competent Board, and the much-desired inter-state comity and general recognition of State licenses.

Committee on State and Local Organizations.

With reference to the formation of this Committee, as suggested by the President, your Committee, realizing the benefit which the work of such a Standing Committee would be, not only to this Association, but to the whole dental profession, and fully coinciding in the spirit of the plan proposed, have to offer the following resolution:

Resolved, That a Standing Committee, to be styled the "Committee on State and Local Organizations," and composed of three members, shall be appointed, originally for terms of one, two, and three years respectively, and that all vacancies due to expiration of term shall thereafter be filled for terms of three years. All vacancies occurring from any other cause shall be filled for the unexpired term.

The basis of the plan and scope of work of said Committee, and its duties in relation thereto, shall be the suggestions as set forth in the address of the President of the American Dental Association for the year 1892, also the articles from which he quotes, and in harmony with the circular letters issued by the Chairman of the Executive Committee.

In regard to the meeting of the American Dental Association for 1893, we recommend the adoption of the following resolution:

Resolved, That the annual meeting of this Association for the year 1893 be convened at the time and for the purpose suggested in the President's address, Tuesday, August 15, 1893, and that the consideration of the report of the Special Committee embodying certain proposed amendments to the Constitution and By-Laws be laid over for consideration at that meeting.

We recommend also that the matter of the death of Dr. John Allen, of New York, be referred to the Standing Committee on Necrology for appropriate action.

All of which is respectfully submitted.

Edward C. Kirk,
L. D. Shepard,
J. N. Crouse,
Committee.

SCHEDULE OF QUESTIONS

SUGGESTED FOR THE

Consideration of State and Local Dental Societies.

No. 1. Should Examining Boards have power to grant certificates of qualification to undergraduates?

No. 2. Should immediate root-filling be practiced while purulent conditions exist at the apex?

No. 3. What are the best materials to enter into the composition of temporary fillings, to be retained for a minimum of three years?

No. 4. What are the best methods for obtunding sensibility of the dentine by either local or general means? Should arsenic ever be used?

No. 5. What are the best forms of partial lower dentures, and the methods for constructing the same?

No. 6. Corrective dentistry: its present status. What are the simplest and most universally applicable forms of apparatus and the most efficient retaining fixtures?

No. 7. To what extent and under what conditions is the collar crown a cause of pericemental inflammation?

No. 8. In cases of congested pulp, should the arsenical application be made without preliminary treatment?

No. 9. What are the advantages and disadvantages of the use of the matrix (*a*) with gold, (*b*) with plastics?

No. 10. The etiology of pus-formation.

SECTION VII.

ANATOMY, PATHOLOGY, AND SURGERY.*

REPORT BY TRUMAN W. BROPHY, CHAIRMAN.

THE Section of Anatomy, Pathology, and Surgery most respectfully submits the following report:

Articles have appeared during the past year in periodicals of the country under the following titles in Anatomy, Pathology, and Surgery. Where they have first appeared in medical journals and were afterward reprinted in dental journals, the name of the dental journal will be given, so that the members will have easy access to them.

PATHOLOGY AND SURGERY.

"Maxillary Cysts Connected with the Teeth." By Ludwig Hektorn, A.M., M.D., Professor of Pathology in the Post-Graduate Medical School of Chicago, Lecturer on Pathology in Rush Medical College, and Pathologist to Cook County Hospital. This article first appeared in the *North American Practitioner*, and was reprinted in the September, 1891, number of the *Dental Review*.

"Necrosis of the Maxillary Bones a Sequence of Measles." By James F. McCarthy, M.D., Dubuque. Transactions Iowa State Medical Society; reprinted in *Dental Review*, December, 1891.

"Affections of the Salivary Glands and Tissues in Close Proximity to Them." By Truman W. Brophy, M.D., D.D.S. *Dental Review*, December, 1891.

"A Brief Treatise on the Common Diseases of the Maxillary Sinus." By H. H. Schuhmann, D.D.S. *Dental Review*, March, 1892.

"Recent Contributions to the Diagnosis and Treatment of Empyema of the Maxillary Sinus." By G. L. Morganthan, M.D., late Assistant at the Throat and Chest Department of the Policlinic, Vienna. *Dental Review*, April, 1892.

*A partial report which was to have been amplified and completed before publication, but owing to the illness of the chairman, Dr. Brophy, this could not be done in season. It therefore appears as presented.—PUB. COM.

"Notes on the Anatomy, Physiology, and Pathological Significance of Pain and other Nervous Phenomena in Relation to Dental Disease." By Thos. Gaddes, M.D., L.D.S. Eng., formerly Dean of the Dental Department, University of Denver. *Dental Review*, July, 1891.

"Necrosis: Its Microscopical Appearance, Causes, and Treatment." By D. M. Sabater, A.B., D.D.S., M.D. *Dental Cosmos*, September, 1891.

"The Human Mouth as a Focus of Infection." By W. D. Miller, M.D., D.D.S., Berlin. *Dental Cosmos*, September, 1891.

"The Pathology of the Trifacial Nerve." By A. B. Freeman, M.D., D.D.S., Chicago. *Dental Cosmos*, July, 1892.

Anatomy and Pathology.

"Studies on the Anatomy and Pathology of the Tusks of the Elephant." By W. D. Miller, M.D., D.D.S., Berlin. *Dental Cosmos*, March, 1891.

Surgery.

"Dental Devices for Correcting Deformity attending the Extirpation of the Left Half of the Inferior Maxilla." By Albert Westlake, D.D.S., Elizabeth, N. J. *Dental Cosmos*, September, 1891.

"Where Dentistry Looks Over into Oral Surgery." By G. Lenox Curtis, M.D., D.D.S., New York, N.Y. *Dental Cosmos*, March, 1892.

"Two Cases of Removal of the Gasserian Ganglion through the Floor of the Skull for Trifacial Neuralgia." By Edmond Andrews, M.D., Surgeon to Mercy Hospital, Chicago. *Chicago Medical Recorder;* reprinted in the *Dental Review* for May, 1892.

"Abscess of the Antrum, with Cases and Treatment." By I. P. Wilson, D.D.S., Burlington, Ia. *Dental Review*, February, 1892.

Pathology.

"Lingual Ulceration of an Epitheliomatous Appearance, due to an Upper Full Artificial Denture." By Arthur C. Hugenschmidt, M.D., D.D.S., Paris, France. *Dental Review*, March, 1892.

The Section also reports the following papers to be read:

"Pyorrhea Alveolaris." By Dr. J. E. Cravens.

"The Grinding-Teeth of the Herbivorous Mammalia." By Dr. A. H. Thompson.

A paper, with exhibition of specimens, entitled "A Study of the Molar Teeth of the Proboscidea." By Dr. W. C. Barrett.

"A New Operation for the Exsection of the Inferior Dental Nerve." By Dr. M. H. Cryer.

SECTION VII.—Continued.

Pyorrhea Alveolaris.—A Case in Practice.

PAPER BY JUNIUS E. CRAVENS, OF THE SECTION.

THE patient. Male, aged fifty years, robust, and apparently in good health, but at that time under treatment for affection of nose and throat.

Diagnosis. Gums generally red and angry-looking, bleeding easily and freely; expressed considerable pus from about the anterior eight teeth in each jaw, the festoons between which were swollen and of a violet color. Complaint of heat and prickling pains about the gums around the teeth specified. Discovered "pockets" on the approximal faces of roots of the pus-discharging cases; some of the "pockets" were notably profound.

July 18. Cleaned up the mouth, removed incrustations from roots in "pockets," and trimmed margins of affected alveolar process as far as practicable; washed out "pockets" with hot water, and treated them carefully with dilute sulphuric acid (one part acid to ten parts water).

Directed the use of pulverized sulphur as a dentifrice morning and night, and to avoid the use of soap or other alkalies in the mouth.

July 19. Gum less congested, otherwise no improvement; washed "pockets" with hot water, and treated them with dilute sulphuric acid as before.

July 20. The superior first bicuspid of the right side was free of pus; gums looked and felt better; washed with hot water as usual, and renewed the treatment with sulphuric acid. Advised ice applications to gum.

July 21. No change. Still some pus from all pockets, except superior first bicuspid of right side. Decided to change treatment; washed out with hot water as before, and treated "pockets" with ten per cent. solution of nitrate of silver. No caustic action observed, and no pain from the lunar caustic solution.

July 22. No pus expressed, except from between lower centrals and right inferior cuspid, and from between and around the superior cuspid and lateral of the right side, at which points were the deeper pockets originally. Washed out "pockets," and treated with nitrate of silver as before; gums looking well.

July 25. Congestion gone, except slight violet tint over roots of inferior centrals, right inferior cuspid, and right superior lateral incisor, and very slight evidence of pus from "pockets" of the three places named; no pus observed from other points. Washed out all "pockets," and renewed treatment with ten per cent. solution of nitrate of silver.

July 26. No pus whatever, except minute quantity from one side of right superior lateral incisor. Gum so completely free from swelling that I was able to discover and remove a few remnants of calculus. Washed with hot water, and treated with solution of nitrate of silver as before.

July 27. No pus found at any point; gums apparently healthy, and patient reported entire comfort. Washed out and treated as before.

July 29. After two days' rest, found no pus at all; the "pockets" evidently filling up by adhesions. Washed out with hot water, and treated "pockets" with the ten per cent. solution of nitrate of silver as before.

NOTE.—The solution of nitrate of silver caused a slight brownish discoloration about the necks of the teeth treated, but exhibited no caustic energy whatever. I think the astringent and antiseptic effects of the remedy were aided and emphasized by the thorough washing out of the "pockets" at each sitting with hot water. I believe the preliminary use of dilute sulphuric acid aided in removing small particles of calcareous matter from the "pockets," and stimulated tendency to granulation there. This case has an unusual interest for me in that it appears to be cured, and in an incredibly short time. It will be under my observation for some weeks longer.

DISCUSSION.

DR. BARRETT: This is a matter of too great importance to be passed over without discussion. If the subject of pyorrhea alveolaris shall awaken no thought in the minds of those present, it will indicate a limited degree of knowledge on our part. I think you will all agree with me when I say that there seems no disease within

our province to treat which calls for so much of careful study and patient investigation as pyorrhea alveolaris. The etiology of the disease has never been fully comprehended; at least it has never been fully expressed. We have had all kinds of treatment recommended for it, always with good results, in the papers that are read, in the discussions that ensue, and in the statements of individual cases which have been made by different practitioners. Yet when we attempt to pursue the same line of practice, and endeavor to follow out the instructions of those who have stood as tutors to us, we have almost always met with failure. At least such has been my experience, and that of most of those with whom I have talked.

Whether pyorrhea alveolaris be solely a special manifestation of a local disturbance, or whether it be a constitutional diathesis, has not yet been determined. If there be predisposing constitutional conditions, local treatment will be but palliative and temporary. If it be but a simple local disturbance, if there be nothing beyond the very point of infection, if it be a disease simply of the soft tissues, local treatment will suffice for all ordinary cases. For myself, I must say that I am not at all satisfied with any method of treatment which I have pursued in the past, and I have followed almost every one proposed. I have never yet found that topical remedies were successful in every case. In some instances, in which it was plain to be seen that there was but a local manifestation from a specially irritative condition which had a local cause, the remedies have removed the difficulty; but in many instances I have found that mere topical remedies have simply palliated the difficulty for the time being, but have not produced a radical cure. What we want is a positive reduction of the disease, if there be any such thing; mere temporary relief is not sufficient, yet that is what most treatment alone gives. Many instances crowd upon my mind that might illustrate this. I do not propose to take up your time by relating wandering incidents of personal practice; but I remember cases which have been under my care year after year. By the use of local measures and medicaments I have been able to check the disease, to hold it in partial subjection; but almost invariably, when it was true pyorrhea alveolaris, within a more or less brief period of time the patient has returned with a new manifestation of the disease. That has been almost my invariable experience in the cases of true alveolitic degeneration which I have attempted to treat.

The remedy that is recommended in this paper is simply a cautery. I know of no particular therapeutic effect which it has, except

that of bringing about the destruction of the tissues affected. If there be anything beyond that, I am unable to comprehend it. The success which Dr. Cravens met with in this instance would indicate what? From a knowledge of the remedy itself and the therapeutic effect it would produce, I am led to the irresistible conclusion that the case was a manifestation of a mere local disturbance from some manifest cause, and that it was not the constitutional dyscrasia that true pyorrhea seems to be in some instances. Not sufficient time has yet elapsed to determine whether there will be a recurrence of the malady. It will be interesting to know this point, and I hope the author of the paper will report upon it at some future day. If it does not return, I shall be confirmed in the impression that it was a case of local gingivitis, or stomatitis, or something of that kind.

In three months, in six months, will there not be a return of the disease, if it be a constitutional diathesis? If it be a local manifestation of a predisposing cause, the symptoms will reappear when sufficient time has elapsed. It will be exceedingly interesting to know whether there will be a return of it, or whether it be a radical and final cure; whether he has palliated the evil symptoms, and simply reduced the inflammation without removing the cause. I am disposed to think he will have a return of that patient with the same manifestations there were in the first place.

I shall be glad to hear the experience of others, and to learn whether in a case of true pyorrhea, if that which the essayist has described be such, there shall have been from the use of any topical remedies, such as were employed in this case, a radical cure, so that the disease has not finally returned with exaggerated force and virulency.

DR. RHEIN: With some of the points which the last speaker suggested I coincide, and with some I do not. From hearing the paper read, it struck me that the case was not a case of pure pyorrhea alveolaris, as distinguished from what is commonly understood as false pyorrhea, or simply a result of bad hygienic care of the mouth. One great objection to the description of the case is the lack of attention to the diagnosis at the outset. The writer stated he believed the patient to be in fairly good health. It is always necessary when a case of this kind presents itself to settle the question, first of all, is the patient in good health, or is he not? We have no right to assume that he is or to think that he is. That is a question we should determine scientifically, and the best way to do it is to give the patient a thorough examination, by physical means, and also by a chemical analysis of his urine.

Assuming that the doctor's assumption was correct, that he was in fair physical health, I unhesitatingly assert that there was no real disease, as we are accustomed to consider this affection. Coming down to another question brought out by the last speaker, the etiology of pyorrhea alveolaris: that question is pretty firmly established in the minds of a great many practitioners, to wit, that the disease that we recognize as severe pyorrhea alveolaris is unquestionably the sequence of some constitutional disturbance, or that constitutional disturbance is present at the time; that is to say, it is the result of a faulty nutrition of the parts. Now, if that faulty nutrition is caused by some severe constitutional disturbance that cannot be permanently cured, it is very easy for us to settle the fact that the pyorrhea cannot be cured.

If, however, it is a curable disease, we can give an entirely different prognosis. If, on the other hand, it is the sequence of some disease, which I have found it to be in very many cases, by very carefully investigating the history of the case we can give a still more favorable prognosis. This is the point I care to bring out in the discussion of the last speaker, to show how our prognosis must be based on a correct diagnosis of the case, which must be determined at the outset. The nomenclature is unquestionably a very poor one, because in a strictly literal sense this is a case of pyorrhea alveolaris. It is a discharge of pus from the alveolar sockets; but we must have some rational manner of expressing our distinction between the result of a badly kept mouth and the disease resulting from some constitutional disturbance. What I particularly desire to call your attention to is the fact that, having settled by physical examination, made either by ourselves or the family physician, whether the pathological condition is purely local or whether it is dependent on some more serious disturbance, we are left with such a positive knowledge of affairs as to be able to give some kind of rational prognosis to our patients.

In conclusion, I would simply concur with the last speaker in regard to the cure of these cases. I know of many cases that have passed through my hands that have never been cured, and I have never promised a cure of such cases, because I have found just that condition of the system present that plainly said the case was hopeless. The patient may have been suffering from tuberculosis, may have been suffering from some severe trouble of the kidneys, there may have been a gouty condition of the system. In fact, every disease that the human system is heir to I have found connected with this trouble in the mouth; and where we find it associated with such

a grave form of disease that the physician having the patient in charge knows it is incurable, it is impossible for us to give a favorable prognosis. It is the one grave disease which shows us we are practicing a specialty of medicine, and for the treatment of which a fair knowledge of the diseases liable to attack any part of our body is an essential requisite.

DR. MORGAN: As to the etiology of this disease, my observation, more than any theory upon which I have acted, has led me to the belief that it is very largely the result of a constitutional condition, a local manifestation of a vitiated condition of the general system, and is in a very large majority of cases inherited.

You will find in your practice that in some families the father and every one of the children of ten, twelve, and fourteen years of age will be affected more or less with this disease, so that I take it it is a constitutional disease; and if it is to be cured at all it must be either in part by constitutional treatment or by a very radical local treatment. Every case can be cured, without a single exception. Remove the teeth, and nature will take care of the balance. The tissues that are particularly affected by the disease are removed by the removal of the teeth. I don't know whether I ever treated a case of decided pyorrhea alveolaris that remained permanently relieved unless I removed the teeth. I have relieved such cases, and they have run along comfortably one, two, three or four, and sometimes five years. I remember a single family of six persons where the disease was evidently inherited from the father. The children fell into my hands from eight to fifteen years of age, and until they had passed maturity I preserved the mouths of that family in pretty fair condition; but I treated them locally, say once in six months. They happened to be all girls, and their teeth were preserved intact, with very little, if any, waste of the gum-tissue of the alveolar process. But there never will be any more trouble in such cases if you remove the teeth,—and I know of no other way of curing the disease permanently.

DR. HARLAN: The subject under discussion is the treatment of a single case, and not the etiology of the disease or the multiplication of remedies. There is no objection to the use of a diluted solution of sulphuric acid around the roots of teeth as a preliminary in the beginning of the treatment of such a case, because dilute sulphuric acid contains about 13 per cent. of sulphuric acid and 87 per cent. of water, and then you dilute that ten times; it is a sufficient dilution, so that when it comes in contact with the fluids of the mouth, or the exuding serum, it will do no damage to the tissues of the teeth,

because in order to do damage it would have to be still further diluted. It would aid very materially, and in my opinion would act much better than a diluted solution of aromatic sulphuric acid, which is one of the most overestimated remedies in the whole materia medica, because it will not dissolve the calcareous deposits or the serumal deposits that are found on the roots of teeth, and diluted sulphuric acid will.

With reference to the use of nitrate of silver (a ten per cent. solution), it is a very excellent remedy. It has been used for many years in the treatment of diseases of the mucous membrane,—the antrum of Highmore, for instance, and elsewhere,—but never in so concentrated a state. What are the effects which should naturally follow the use of a ten per cent. solution of nitrate of silver? First, it would be a powerful astringent. Secondly, it would act as a stimulant, and the reason for its checking the flow of pus and the closing up of the pockets in such a short space of time would be due to the properties mentioned.

To say that the case was cured after eleven days of treatment would be saying something that I could hardly think possible, because if the pockets were of the depth of one-half the length of the root there could not be a reproduction of tissue in that short time, with the continual and repeated washing of the pocket. The effect of the use of hot water as a preliminary is very excellent, and there is nothing whatever to say against that, because hot water is a very useful agent in a great many cases, and very much more beneficial in the vast majority of cases that dentists are called upon to treat than the agents they do use, because many of them are used unintelligently. Hot water as a therapeutic agent, is something that dentists fail to utilize, and so Dr. Cravens, I think, has made a very good point in that regard. I invariably use hot water to syringe the mouth in the beginning; and whenever I desire to have the effect of a medicinal agent on the edges of the alveolar process, I use diluted sulphuric acid, but I dilute it with cinnamon water, instead of ordinary water, taking cassia water, which most cinnamon water is made from, because cassia is a much cheaper oil than cinnamon, and equally effective. I think perhaps in that way I may get a little better effect than from ordinary hydrant water.

As the question of the treatment of pyorrhea alveolaris will come up under the head of therapeutics, I just wish to say that I thank Dr. Cravens for his presentation of the subject in this way, because anything that will add to our resources in the treatment of a disease

of this kind is of value. It is undoubtedly much more local than some gentlemen think. Dr. Morgan says whenever you extract a tooth the disease is cured. No one ever saw a case where the tooth was extracted but that the mouth became perfectly healthy under any and all circumstances, so that there is a strong probability that it is purely a local disease, with many coincident constitutional manifestations, and most of them not the causative.

DR. CRAVENS: I have very little to say in closing the discussion. I think Dr. Barrett misunderstood me in regard to the caustic effect of the nitrate-of-silver solution. I stated in the paper distinctly that I could observe no caustic effect at all. I cannot quite agree with Dr. Rhein that the disease is always complicated with constitutional affections. Dr. Thomas W. Evans, of Paris, told me that he had seen so many cases associated with affection of the kidneys that he believed it was very likely to come to be recognized as a manifestation of kidney trouble. He told me, furthermore, that in that country a great many dentists regard it as a form of gout.

In regard to the analysis of the urine, I do not believe dentists can always do that. I have not the facilities, and I doubt whether I have the ability. In regard to whether the case is cured or not, I simply expressed the opinion that it was. It will be under my observation for several weeks. The gentleman lives in Nashville, and I shall take pleasure in letting Dr. Barrett and the other gentlemen hear of the result. I am thankful to Dr. Harlan for the elucidating character of his remarks. They are quite encouraging.

SECTION VII.—Continued.

A New Method of Resection of the Inferior Dental Nerve.

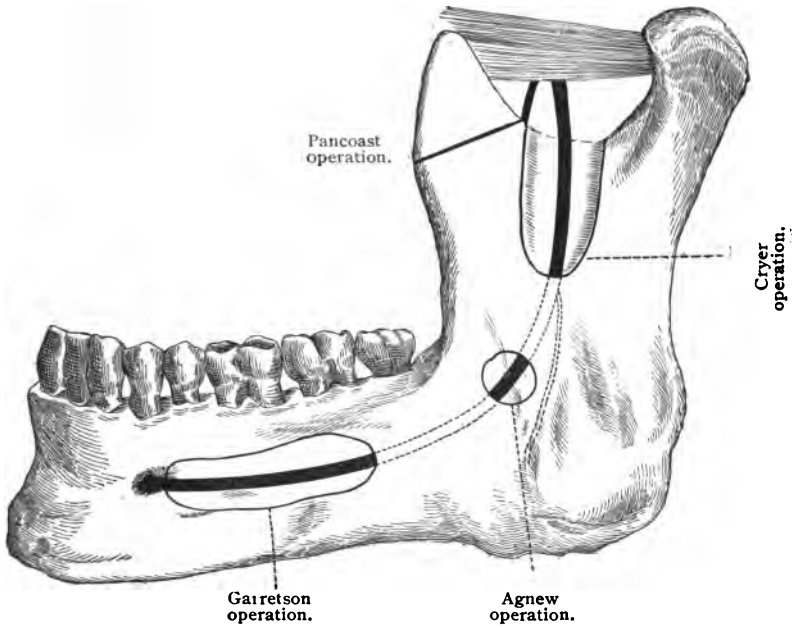
REMARKS BY M. H. CRYER, OF THE SECTION.

I WISH to report a method for the resection of the inferior dental nerve which is believed to be new. It will be remembered that sensation of the lower jaw and its immediately associated parts comes through the inferior maxillary division of the fifth pair of nerves. Its sensory portion is derived from the Gasserian ganglion, and passes out of the brain-case through the oval foramen in the great wing of the sphenoid bone. The inferior dental nerve is given off from the fifth nerve soon after it passes through the foramen, and passes between the two pterygoid muscles to the inferior dental foramen, which is situated in the inner side and about the middle of the ramus of the inferior maxillary bone. This foramen is the opening of the inferior dental canal, which passes downward, forward, and outward, and terminates at the mental foramen, which opens on the external portion of the body of the bone, and is usually found midway between the upper and lower borders of the bone and below the root of the second bicuspid tooth. The nerve passes into this canal, giving off branches to the bone and to the teeth, and terminating at or near the mental foramen. Branches pass out through the foramen to the lips, mucous membrane, and labial glands. Just before the nerve passes into the bone the mylo-hyoid nerve is given off, which is distributed to various muscles and tissues of the mouth.

Many anatomists claim that the mylo-hyoid nerve is motor in character, its fibers being traceable from its point of distribution backward to the anterior or motor root of the fifth pair; but clinical experience for the past twelve years in the Hospital of Oral Surgery, where cases can be seen very often, inclines me to believe that the nerve is of

mixed character after it leaves the inferior dental. The reason for this belief is that in many cases when the inferior dental nerve has been removed entirely from the canal in the body of the bone and far up into the ramus, the patient has not been cured; but relief has been given at once to the same patient by cutting the inferior dental above the point where the mylo-hyoid nerve is given off.

In neuralgia of the mouth and jaw, the inferior dental nerve has been operated upon in various ways, with which no doubt all the members of the Association are acquainted, though it may be well to



review a few of them. In one devised by Dr. Garretson, an incision is made in the soft tissue along the lower border of the body of the inferior maxillary bone, the tissue elevated so as to raise the opening upon the bone in a line over the inferior dental nerve; then, holding the lips of the wound apart with retractors, the covering of the canal is removed by a circular saw and bur driven by a dento-surgical engine. In this way the entire canal within the body of the bone can be exposed and the nerve removed, the soft parts being allowed to assume their normal position and the wound closed. The small scar from such an opening is almost unobservable. Another operation, de-

vised by Dr. Agnew, is to make a trap-like opening over the lower half of the ramus, then remove a portion of bone by the use of a trephine, thus uncovering the canal, when a portion of the nerve can be taken out. These operations often fail to cure. It is claimed by several surgeons that the mylo-hyoid nerve is involved, thus accounting for the failure. Dr. Joseph Pancoast's operation was to remove the coronoid process. The objection to this is that it causes, to a great extent, the loss of the use of the temporal muscle. It is also difficult, by such operation, to reach the nerve, on account of the awkward position and the interference of adipose tissue.

The difficulty in taking the nerve up from this point suggested to me, some two years ago, that instead of cutting away the coronoid process the sigmoid notch could be deepened to the inferior dental foramen. In making the trap-like opening, avoid cutting the duct of Steno. The bone being exposed, take a large spear-pointed drill, and, using the dento-surgical engine, perforate the part of the bone to be removed; then with a barrel-shaped surgical bur, having a smooth or safe end, remove the bone nearly down to the foramen. In working with the engine, either with a saw or bur, it is well to have a large bottle filled with antiseptic fluid suspended above the operating-table, allowing the liquid, by the aid of a small tube, to flow over the parts while operating, thus preventing the bur from clogging, and as well keeping the parts free so that the operator can see just what he is doing.

After removing the bone, the nerve, artery, and vein can readily be lifted up by the use of a tenaculum. The nerve must then be separated, and taken hold of by hemostatic forceps above the point at which the mylo-hyoid nerve is given off; draw as much of the nerve out of the canal as will come, and cut the mylo-hyoid nerve as near to its distribution as possible. Still holding the nerve in the forceps, dissect it out from the tissue, and cut it off near the oval foramen. It is much better to cut the nerve than to break it.

DISCUSSION.

DR. PATRICK: I would like to ask who the surgeon was that removed the coronoid process to get at the inferior dental nerve?

DR. CRYER: Professor Joseph Pancoast, of Philadelphia.

DR. PATRICK: In performing that operation, he would destroy the action of the temporal muscle?

DR. CRYER: I said that it caused to a great extent the loss of the use of this muscle.

DR. PATRICK: I want to ask another question,—how you could amputate the portion of the ramus lying between the coronoid process and the neck of the condyle without finding that the zygomatic arch interfered with the operation of severing the inferior dental nerve?

DR. CRYER: It did not interfere. As to whether the operation cured neuralgia: The operation through the deepened sigmoid notch which I have described has been performed twice: the first time in March, 1891, and the second time in March, 1892. Both patients have remained well, except that the one first operated on sometimes feels a little twinge. But it is possible that this is from another nerve.

DR. A. E. HOADLEY: I have listened to the description of this so-called new operation with much interest. There are new points about it, inasmuch as it contemplates extending the zygomatic notch. Other than that I do not think there is anything new.

It often happens that when the old operation of trephining over the inferior dental canal is undertaken, the bone which exists above that is split out for the purpose of giving more room. Pulling out the inferior dental nerve is sufficient to destroy the function of the nerve. If it is pulled out from the inferior dental canal, there will certainly never be any further neuralgia from the ramifications of the inferior dental nerve. Its peripheral function is irreparably destroyed. Should neuralgia continue to manifest itself over the branches of the nerve, it is proof positive that the irritation exists higher up.

There is one other point that I wish to speak of with regard to the anatomy of the parts.

The coronoid process only rises very slightly above the zygomatic arch, to which the temporal muscle is attached. It can be cut off far below the zygomatic arch. And another thing, it can be brought together, having been divided, and with first-class prospects of uniting. If I remember rightly, the gentleman who described the operation stated that it was objectionable to divide the coronoid process, from the fact that it was slow of union. If we make good apposition, and secure the severed portions with wire sutures, we get union. In all plastic operations of the under jaw we get union. It is a bone which unites readily, as a rule, under almost any kind of circumstances; but once in a while we have a diseased process established, which perhaps will not interfere with the union of the bone, but will set up a diseased condition which may give some trouble for a long time by perhaps interfering more with nutrition of the bone than anything else.

The operation is one that is extremely simple and unattended with danger, and it can be performed exactly according to the method laid

down by the gentleman who described it, and the nerve can be cut off a little higher by making this notch than by the old method of trephining. But the difference between the point at the division of the nerve above the branch of the mylo-hyoid is not sufficient to make any difference with neuralgia that arises from irritation upon the inferior dental nerve. The distance between the division of the mylo-hyoid and the highest point described by the gentleman would not make any difference in the curative effect of the operation. If it is anywhere above the branch of the mylo-hyoid, it will in all probability be at the foramen, and the quarter of an inch that could be divided by cutting out the upper part of the zygomatic arch, and the old-fashioned trephining method would not avail much.

DR. MORRISON: I am very much surprised to see this subject brought up in this form, advocating so extensive and unpleasant an operation from the outside, when the ready method which was used and first introduced by Professor Hodgen, of St. Louis, in 1875,* at my suggestion, of using the dental drill on the superior surface of the ridge through the mouth, making two or even only one hole through the upper part of the jaw-bone down upon this canal, cutting the nerve off at any desired point, is so much more simple. This operation gives as complete relief as any of these extended surgical operations have ever afforded.

DR. FILLEBROWN: I will do one better, and not make any wound at all on the external surface. I would not work from the outside at all. The fact is, an operation effects a permanent cure in only a very small proportion of cases, and it seems to me hardly best to make such an extensive disfiguration of the patient as the operation of opening from the outside of the face will cause. It is possible to remove the nerve to within a quarter of an inch of the point at which the operation described removes it, and all within the mouth. I have a patient that to-day has the inferior dental nerve removed from the second inferior bicuspid in the mouth to more than half an inch beyond the inferior dental foramen. She suffered extremely with neuralgia of the left side of the face. I trephined the jaw, and removed three-quarters of an inch back of the second bicuspid. She was well for a year and a half. I thought I had made a permanent cure, but she came back suffering again. I made another operation. I opened the canal to the foramen, and took all the nerve out to the soft tissue. She got relief for

* Reports of which may be found in the Transactions of the American Medical Association, held in Philadelphia, centennial year, 1876.

six months. She afterward insisted that I should try again, and go still farther. There was not much hope, and I operated partly to satisfy her, and also to prove that the end was not involved in a cicatrix. The second operation cured her for six months. The last operation did but very little good, and to-day she is suffering severely. The trouble is, I think, with the nerve-centers,—either the medulla or the Gasserian ganglion. The point I want to make is, that to remove the nerve it is entirely unnecessary to disfigure the face : it may be done readily through the mouth.

DR. BROPHY : I have had no occasion so far to make an external incision for the removal of the inferior dental nerve. The operation for the removal of the dental nerve within the mouth I think can be accomplished in every case where the operator may successfully approach the posterior surface of the second molar for the insertion of a filling. The operation that has been described by Dr. Cryer is perhaps a new one ; but it seems to me, as has been said by the last speaker, that the external incisions should be avoided in all cases where it is possible to avoid them. It is true, if we have to go to the center for the purpose of dividing the nerve as it emerges from the foramen, it will be necessary to make an external incision ; but to so proceed in such a case as to prevent neuralgia from recurring, we must remove not only the nerve but the inner portion of the canal, so as to induce an exudation, and this we can do by exposing the nerve with a strong drill as it passes out of the mental foramen, carrying it back along the canal and reaching a point as far back as possible, and then with the forceps seize the nerve and draw it forward and excise it.

If we do this within the mouth, and then clean out the canal and cleanse it antiseptically, in a short time it will be filled with new tissue, the nerve will not be reproduced, and the neuralgia will not recur.

The operation of seizing the nerve with the tenaculum at the dental foramen may be done and the nerve divided in that way, but the danger of hemorrhage which has been mentioned would make us hesitate some in performing this latter operation. I think it is always well to perform the operation within the mouth, and if you find it becomes necessary to make a more extensive operation, the external incision should be made as a last resort.

DR. CRYER : There was no idea of provoking a discussion when describing this method, and I hope it is understood that the gentlemen with whom I am associated would not think of making an external

incision until minor operations had been tried. All of us know that the nerve-tissue when cut will, under certain circumstances, unite. Of this we see many instances. In my own body two and a half inches of nerve-tissue have been reproduced, so that I believe that where neuralgia returns after operation it can be attributed to this cause. Dr. Morrison speaks of disfiguring the face by making the opening spoken of. In olden times such might have been the case. To-day it is so performed that within two or three weeks the scar is almost unobservable. Dr. Fillebrown speaks of resection of this nerve where it enters the inside of the jaw by operating through the mouth. This is a very difficult operation, and a good many factors are to be thought of in connection with it. Having to work through the mouth, it is difficult to keep the patient under the anesthetic ; the parts are very vascular, the blood and saliva soon cover them, the patient gags, etc. Only a very short piece of the nerve can be taken out, and this will account for the recurrence of the pain as spoken of by the doctor. The main point in all resections of this kind is to remove as long a piece of nerve and as near to the base of the skull as possible, and then, if such operations fail, to remove the Gasserian ganglion. Another serious objection to the operation spoken of by the doctor is that you are in the neighborhood of important vessels, and should they be cut, it is in this position very difficult, almost impossible, to ligate them. In one case in which I assisted in this mouth-operation, we had a hard time to save the patient's life. The only object in describing the operation which has called forth the discussion was to draw attention to the fact that by deepening the sigmoid notch you open immediately over the nerve, where you are free from every tissue, and I wish to claim here the importance of that freedom.

SECTION VII.—Continued.

The Grinding-Teeth of the Herbivorous Mammalia.

PAPER BY ALTON H. THOMPSON, OF THE SECTION.

THE molars of the herbivorous mammalia present an interesting and remarkable example of a high degree of specialization. The complex structure of the masticating surface of these teeth is produced by an arrangement of the dental tissues in alternating layers, the different densities of the enamel, dentine, and cementum allowing of different degrees of wearing away, so that an irregular surface is constantly presented for the purpose of triturating resisting vegetable fiber, which is such an important function in the physiological economy of the vegetable-feeders. In use, the enamel, being hardest, stands highest; the dentine, being less dense, stands lower; and the cementum, being softest, stands lowest of all. As Owen says ("Odontography"), "The most complex and varied systems of dentition are found in the great natural group of the hoofed quadrupeds. The molar teeth are of a complex structure, produced by an interblending of the dental tissues of the crowns, producing that noticeable efficiency for mastication. Various patterns result from the variety and arrangement of these tissues." The molars in the Ruminants and all vegetable-feeders are formed as though layers of enamel, dentine, and cementum had been laid upon one another and the whole then rolled and crushed together. This produces a very effective instrument for mastication, and is a highly specialized form of tooth, as we shall notice later.

A cross-section of the tooth reveals a pattern which presents great variety in different species, and is of distinct diagnostic value. This pattern differs in different families and orders, but is uniform in a species, and is closely related in each genus. By the study of this pattern, naturalists have a means of diagnosing species, and it is of

great value to the paleontologist in the classification of the remains of extinct animals. The teeth are the most durable of the animal tissues, and form the most constant medium for the identification of fossil remains. In the evolutionary history of the horse, which was so beautifully worked out by our brilliant paleontologists, the testimony of the teeth was necessary for the confirmation of the descent of the species. It is satisfactorily proven that the single-toed horse of to-day is descended from five- and three- and two-toed ancestors who have all the characteristics of the horse, even to the molar pattern. So the biological history of other groups has been worked out with more or less certainty, and the teeth have performed an important part in the evidence they have furnished. And in the vegetable-feeders the characteristic patterns of the molars have been reliable indications of affinities, on account of their uniformity. As Owen again says, "Different groups of the Ungulata, not only orders and genus, but even species, are characterized by the various patterns which result from the various forms, directions, and proportions in which enamel and cement alternate with dentine in the substance of the crowns of the complex molars."

The most highly specialized group is that of the Ruminants, of which Owen says, "In the Ruminants the characteristic complexity of the molar teeth is manifested even in the deciduous series, but in the permanent series only by the three posterior teeth of both upper and lower jaws, which are the true molars. The complexity is the result of peculiar folds of the formative capsule, some of which are longitudinal or project inward from the sides of the capsule and form peninsular folds of enamel upon the grinding-surface of the tooth, while others depend vertically from the summit of the matrix into the body of the tooth, and form islands of enamel when the crown begins to be worn. Of the longitudinal folds, two, in the upper true molars, are external, broad but shallow and often sinuous, and one is internal, narrow and deep, and extending quite down the summit of the crown and decreasing in depth toward the depth of the crown; the corresponding folds of enamel in the completed tooth accordingly extend more or less across the tooth, from within outward, as the tooth is more or less worn. The crown of the tooth is thus divided into two lobes, placed one in front of the other, the inner side of each lobe being convex, the outer concave in a less degree, and usually sinuous or with a convex prominence in the middle. The vertical folds of the capsule, two in number, extend one into each lobe, and in the upper molars are concave toward the outer and convex toward

the inner side of the lobe, which is thus divided into semi-cylindrical lobules, with crescentic summits, as seen on a transverse section or on the grinding-surface of the tooth, each lobule consisting of a middle bay of dentine and an outer coat of enamel and thin cement. The mid-space between the lobules, the center of the vertical folds, is filled with cement, and commonly contains portions of vegetable fiber; it is inclosed by a crescentic island of cement, and the whole of the circumference of this complex molar is also invested by a coat of enamel, and this by a layer of cement. Different genera of the Ruminants also differ in the depths and sinuosity of the two outer longitudinal folds, and in the depth and complexity of the two vertical folds, which likewise are united in some species by a longer column than in the others.

"In the family of the Sheep and Goats the two outer depressions are broad and shallow, with a very low middle convexity, and are bounded by well-defined, narrow, prominent longitudinal ridges, the posterior or third ridge being less developed than the other two, and there is no internal accessory column. The Goats offer a rudiment of a secondary fold at the extremity of the insular canals, which is rarely seen in the Sheep.

"The Antelopes have the medium convexity of the two outer shallow depressions of the upper molars more marked than in the Ox, and the crescentic enamel-folds are wider.

"In the Ox, the outer border of each lobe of the upper molars is more sinuous than in the Antelope or Sheep, the middle convexity being more prominent and the lateral depressions deeper. The crescentic islands are not so wide as in the Antelope, and the ends less marked.

"In the Deer the inner crescentic subdivision of each lobe is thicker transversely than in the Bovidæ, and in the extinct species of the genus (as the great Irish Deer), the large molar teeth, the crescentic islands are more horned and more simple than in the Ox. There is a later division of the vertical fold of the capsule, and the cavity is continued till a later period of attrition.

"In the Elk the lateral crescents are continuous for a still longer period, the medium transverse fold extending its full length for a greater extent, and the crown continues to be divided during a longer period by a crucial incision.

"In the Giraffe the medium convexity of the outer surface of the anterior lobe is more prominent than the anterior border of the convexity from which it rises, while the anterior border of the

posterior lobe is more produced than the middle prominence. The crescentic enamel-folds are continued into each other until the tooth is worn low down.

"The teeth of the Camel present the most simple condition of the ruminant type of these teeth, the transverse fold dividing the column being short, and the dentine of the two lobes form a continuous tract, The base of the crescentic folds of the capsule being likewise short, the enamel islands are now separated from each other, and the longitudinal depressions of the crown have no middle rising, and there is no column at the interspace." In other words, as we would say nowadays when the evolution theory accounts for tooth-form, the lesser complexity of type of the Camelidæ shows that it is a survival of a primitive form, and the greater complexity of the molar teeth of the Deer, for instance, means that that type is a later outgrowth; the evolution of tooth-forms, like everything else in organic nature, proceeding from the simple to the complex, excepting always the cases where there is evident retrogression.

"Cuvier compares the lower molars of the Ruminants to the upper ones reversed. In the lower true molar the simple medium longitudinal fold is external, and divides the convex outer side of the two lobes. The base of the fold extends in some species across the crown for some depth. The inner surface of the molar is generally sinuous, the concavities being rarely so deep as those of the upper molars. The lower molars are always thinner, in proportion to their length, than those above, and the crescentic islands are narrower and less marked. The last true molar of the lower jaw is characterized in the Ruminants by the addition of a third posterior lobe. This is small and simple in the simpler teeth, as in the camel, and larger and more complex in the Bovidæ and Cervidæ, which have more complex teeth.

"In the Hog (*Sus*) the molars progressively increase in size from front to last. The crown is simple. The first true molar primarily shows three cones, with smaller subdivisions, formed by the wrinkled enamel and an anterior and posterior ridge. The great extent of the last molar is chiefly produced by the development of the back ridge into a cluster of tubercles. The lower molars are similar to those above, but rather narrower. The transverse depression on the lower first and second true molars is deeper than in the uppers. When worn down somewhat, the enamel coats of the three lobes form three islands arranged in a triangle. Many variations of greater or less importance are found in the living and extinct species of *Sus* and related genera.

"In the Hippopotamus the true molars are primarily divided into two lobes or cones by a wide transverse valley, and each lobe is subdivided by a narrow antero-posterior cleft into two half-cones. A strong ridge bounds the base of the crown. When the crown wears down somewhat, each lobe presents a double trefoil of enamel on the grinding-surface, and when much worn each lobe presents a quadrilobate figure. The last molar has a fifth cusp." The extinct Hippopotami follow the type of the living species, and the remains are readily recognized.

"In *Equus* the molar teeth present an intermediate pattern between the Ruminants and some extinct forms. The crown is cubical, has a valley penetrating obliquely from behind forward across the face, crossed by two crescentic valleys, which soon become insulated, as in the Camel." The molars of the horse thus approach a lower, simpler form, and are not so complicated as in the Ruminants. "The large internal lobe is like the extinct forms. The horse's teeth bear a close analogy to those of the rhinoceros. In the lower jaw the teeth, as in other Herbivora, are narrower than the upper molars. They are divided externally into two convex lobes, and on the inner side present three unequal convex ridges.

"In the Rhinoceros the molars are sub-cubate, and the grinding-surface, when moderately worn, is penetrated by two folds of enamel and a valley. The principal valley extends obliquely from the inside outward and forward about two-thirds across, where it terminates, according to the species, in a cul-de-sac. The second and smaller valley is usually of triangular form, and indents more or less deeply the posterior border of the crown. In some species this is wanting in the last molar, which has a trihedral crown. In the lower jaw the molars have a narrow crown, divided into two crescentic lobes placed obliquely." The Rhinoceros molar is readily recognized in fossil forms, and is simpler and less complicated than in the Horse.

In the Proboscidians we have an interesting group. Beginning with the Mastodon, we find that this extinct pachyderm "had molars whose grinding-surface was divided into wedge-shaped, transverse ridges, and the summits of these were subdivided into smaller cones of teat-like shape. The molars above had three bifid transverse eminences, and a tuberculate ridge along the front, back, and outer part of the base. In the last molar the basal ridge is usually more developed. The fourth molar had four transverse, bifid ridges, and a posterior talon."

The Elephants are the only living examples of the great Probos-

cidians, of which a great variety have lived upon the earth in past geological days, as evidenced by their fossil remains. Their "molar teeth are remarkable for their great size, even for the size of the animal, and also for the extreme complexity of their structure." The earlier forms are simpler, and the later and last are more complicated. "The crown is deeply divided into a number of transverse perpendicular plates, each consisting of a body of dentine covered by a layer of enamel, and this by a less dense bone-like substance which fills the inner spaces of the plates and binds them together before they are fully formed and united by confluence of their bases into a common body of dentine. The growth of each plate is analogous to that of an entire tooth, for it is as complex. These plates are formed and then blended together to form the continuous crown." When the molar is worn, the pattern of the ends of the enamel-plates presents variations in different species of Elephants, both living and extinct. For instance, the two living species, the African and Indian Elephants, differ perceptibly; in the one the end of the plate is a long oval in shape, and in the other is more diamond-shaped and wrinkled. "The molar teeth progressively increase in size from before backward, and succeed each other from behind forward, the worn-out teeth dropping out of the groove in front. The last molar is largest and appears late in life. It often contains twenty to twenty-five plates."

Some of the Rodents have a somewhat complicated structure of the molars, but the order is so vast that we can only describe them in general. At first they are only simple tuberculate molars, and when the summits are worn off present a simple pattern of alternating valleys and ridges of enamel and cementum; but as age progresses the grinding-surface is reduced to a smooth field of dentine bordered by enamel, as in man. The folds have a general tendency to a transverse direction across the crown of the tooth, a shape accommodated to the modification of the joint of the lower jaw, which allows of backward and forward movement during mastication. There is not much variation from the transverse type of ridges in this order. There is a difference between the rootless molar of continuous growth and those of limited growth which have roots. As the habits vary, the teeth vary in different species. Some approach the Ruminant type, and others again are more like the elephant in the form of the transverse plates.

The origin and evolution of the teeth of the plant-eaters is a most interesting study. Being highly specialized, they have arrived at a high degree of perfection by gradual steps, most of which can be traced in the successive steps furnished by both living and extinct

forms. As Professor E. D. Cope says ("Origin of the Types of the Molar Teeth," etc.), "The simple tubercle may be regarded as the least specialized form of tooth, and the transition from simple to complex teeth is accomplished by repetition of the type of the simple tooth in different directions. Complex teeth, as the tubercular molars, merely exhibit additional lateral tubercles, and sometimes additional longitudinal ones. The form is complicated in two ways: *i.e.*, either by the folding of the sides, or by the development of tubercles on the crown. Upon this basis are constructed the more complex types of teeth exhibited by the various families of the Ungulata and some Rodentia. The crowns of the superior molar teeth of the higher mammalia are supported on three roots, two of which are external and the third internal. The corresponding inferior molars are supported on two roots, and are less complex. But these two roots usually support four tubercles, two on each side, while the roots of the superior molars support directly but one each. The crown of the inferior molar is therefore more complex than that of the upper." He divides the different kinds of molars into special classes, as follows: 1st, The haplodont, in which the crown is undivided and simple: low and obtuse as in the Cetacea, or raised and acute as in the Carnivora. 2d, The ptychodont type, the crown folded upon the sides, the folds frequently crossing the crown, as in the Rodentia. 3d, The bunodont type, the crown supporting tubercles, which are few and opposite or alternating, and may be many and irregular. To this class belong the Mastodon, Man, the Bears, the Carnivora, and some Rodentia. 4th, The lophodont type, the summit of the crown thrown into folds of transverse or longitudinal direction, as in the higher ungulates. It embraces the many types of ungulates, some Rodentia, and others. "The transition between the bunodonts, or tubercular teeth, and the lophodonts, or folded teeth, is very obvious, so as to lead to the belief that the several subdivisions of the lophodonts represent modifications of corresponding types of bunodonts. Intermediate forms are seen where the tubercles of the mandibular teeth are compressed, while they remain conic. Thus the teeth of the Hippopotamus, whose molars present four principal tubercles, are truly bunodont; the valleys separating the tubercles are deeper than the truly bunodont genera, but much shallower than those of the true lophodonts. In the latter the valleys are deepened and the tubercles are more compressed and elevated, as in the Deer. In the ancient species of Deer the crests are lower and the valleys shallower than in the living species. The lophodont molar was produced by modification of the bunodont,

and the manner of the change has been by constant acceleration of the growth of the folds of the crowns upward, and perhaps downward, in its long axis, and acceleration of the length of the crown." Or again he says ("The Extinct Mammalia"), "The ordinary tooth of the higher type of the mammalia, whether hoofed or not, with some exceptions, is complex with crests or cusps. By cutting the complex grinding-surfaces we find that they have been derived by the infolding of extensions of four original cusps or tubercles. They have been flattened, have been rendered oblique, have run together, have folded up, have become acute, have descended deeply, or have lifted themselves, so that we have teeth of various kinds, sometimes very elegant and ofttimes very effective in mechanism. In many primary ungulates the primitive condition of four conical tubercles is found, and in passing to older periods we find the mammalia of the Puerco period, which rarely have more than three principal tubercles. In the succeeding periods, however, they get the fourth tubercle, and then others, and finally a complicated grinding or cutting apparatus."

Extensive study has convinced the naturalists and evolutionists of our day that the Lamarckian theory of use and disuse, or, as it is latterly called, the mechanical effects of use, have had the principal influence in the development of tooth-forms. Dr. John Ryder, in his article "On the Mechanical Genesis of Tooth-Forms" (*Proc. Academy Nat. Sci.*, Phila., 1878), has elaborated and described this fully, and shown how the theory accounts most beautifully for the origin and formation of many forms of teeth, and especially of the class we are now studying. He says, "Among the Ungulata the most conclusive evidence is found of dental modification. The numerous living and extinct forms present a remarkable chain of dental forms gradually developing from the bunodont type and passing into the exclusively modified selenodont type, acquired by increasing mobility of the mandible. In Elephas and Mastodon the jaw-movement is from behind forward. The molars are tuberculate in crown-crests, which become obsolete from wear, and expose the transverse plates." The antero-posterior movement has developed the form which offers the greatest resistance to this movement in mastication and consequent efficiency in reducing food. The primitive form of jaw-movement is that of simple opening and closing, as in the typical Carnivora. Next came the backward and forward movement, as in the Proboscidea and other primitive types, and then the lateral movements of the jaw, and finally the extensive triangular excursions of the jaw of the Ruminants and other vegetable-feeders as the highest of all. "The opening and

closing movement is most characteristic of Dogs, Cats, Pigs, Hippopotami, Bats, Opossums, and all other bunodonts or their immediate allies. The Pigs show the first tendency to lateral movements, and have lengthened crests to oppose this movement of masticating. The Tapir presents still more lateral movement, and the Kangaroo still more. The Rhinoceros describes a much larger excursion, and the Ruminants the largest of all. In these the lateral is quite extensive, if not more so than the longitudinal movement. In all these forms there is, of course, corresponding modification of the condyle and the glenoid cavity to permit of the typical movement. Indeed, the development of the peculiar movement of each class has modified the articulation, as it has the teeth. The forms of teeth result from the strains incident to mastication. Thus, in Lepus the strain is upon the inner side of the upper molar and on the outer surface of the lower molar. This leads to a peculiar straining and curving of the teeth, and a corresponding arrangement of the dental tissues, "the recurved enamel pattern of the opposing molar series simulating most closely some of the mechanical devices used by man in grinding-mills."

In *Cervus* the idea of "displacement due to strain" is shown most remarkably. There is some evidence that the premolars are acted upon from the external side as well as from the internal, which tends to keep the jaw narrowed at that point. The true molars are, however, acted upon from the inside on the upper and the outside on the lower jaw. This tends to spread the jaw at those points and modify the enamel pattern. The motion being lateral, the straining, both on tooth and tissues, must be very powerful. In the Giraffe the molar line of the lower series is slightly convex internally, and it has extensive lateral excursion of the mandible. The upper series is convex externally. The displacement seems to be greatest where the masticating muscles act with greatest force. In the Rodents there is a reciprocating motion which counteracts the lateral, so that displacement is not very great. In *Cervus* there are deep transverse valleys and cross-crests, showing the persistence of this arrangement where the mandibular movement is entirely lateral.

"It looks as though the strains incident to mastication had pressed the cusps of the tooth flat and curved their cornus outward in the upper series and inward in the lower, by their oft-repeated excursions in one direction. The flexures are modified in accordance with the various directions of the excursion forces, and the plicate layers of the dentition of the horse, and perhaps of the ox and deer, may be accounted for in the same way. The plication is greatest in a line

parallel with the direction of the strain executed during mastication. Another circumstance is the greater inclination of the inner cusps of the upper molars outward and of the outer ones below inward, which is so common among selenodont ungulates.

"The mandibular apparatus of mammals may be regarded as a lever of the third class, in which the glenoid cavity is the fulcrum, the muscular force the power, and the resistance of food to the teeth in crushing is the weight. Since the coefficient of muscular force is one hundred and four pounds to the square inch of transverse section, it is easy to surmise what would be the tendency of the force of mastication. It is not all expended in reducing food, but must react upon the structures which are subjected to the strain."

But we cannot follow this interesting subject further. Enough has been given to show the origin and the method of evolution of the remarkable and complicated structures of the molars of the herbivorous mammals. The great influence dictating this unique formation is food-selection, which is so powerful in modifying the masticating apparatus of animals. In no field is the study of tooth-formation and its evolution more interesting than in that of this class, on account of the highly specialized forms that have been developed in obedience to a demand for a more effective apparatus for the reduction of refractory foods.

SECTION VII.—Continued.

*A Brief Study of the Molar Teeth of the Proboscidea.**

PAPER BY W. C. BARRETT, OF THE SECTION.

THE student of comparative dental anatomy nowhere, in all the broad realms of nature, finds better opportunities for study than in the teeth of the Pachydermata, or thick-skinned animals, a sub-division of the great order of the Ungulata, and in which the Proboscidians form a sub-order. In tracing the modifications of dentition through the different species, it must be remembered that a number are lost, and the regular gradations do not appear.

Nor should this be considered a thing strange. When we reflect that of the living animals existent upon the earth at this time, the remains of scarcely one will probably be found sufficiently intact to allow of any inspection a few ages hence, and then remember the millions of years which were required to produce any material modification, it is no wonder that many important genera are lost. Countless numbers of animals are dying annually. How often is the complete skeleton of even a bird found in the fields or woods? It requires a peculiar combination of circumstances to produce a fossil. Only such organized beings as existed in situations that, through geological changes, allowed their sudden imprisonment within a forming matrix, would find these favoring conditions. A sudden upheaval of plastic material, like clay or fine disintegrated rock, might so bury them that ordinary decay would be impossible. Then, under very unusual circumstances, there might be a slow substitution of the organic material by mineral elements, without the loss of the appear-

* The beautiful sections of the teeth of Elephas, and most of the accompanying specimens, were prepared in the Natural Science Establishment of Henry A. Ward, Rochester, N. Y., and loaned to the author for study and illustration.

ance of structure, and a mineralized, indestructible fossil would be the result. It is only at the margins of great bodies of water that these favoring circumstances are found. The changes there may be induced by unequal cooling and shrinkage of the crust of the earth, and it will only be in such locations that the proper investing matrix will be found.

In the interior of great bodies of land the geological changes are usually much slower, and hence there is no opportunity for mineralization. The more violent geological modifications are brought about by volcanic action, and the heat destroys all organic matter. Hence it is only the very ancient animals and structures which lived near the margins of great seas, or within them, that exist in a mineralized fossil form to-day. The terrestrial fauna and flora have entirely disappeared, no trace of them being left, and thus have been obliterated the modifications of orders, and the traces of many early species of the Mesozoic and Tertiary ages. Occasionally the upheaval of what was once the bed of a great sea brings to light hidden treasures, as in the fossil beds of Wyoming, in the center of what is now the North American continent.

But in the pachyderms, as they now exist, or have existed within comparatively modern times, modifications may be traced which are a sure indication of the gradual development of certain species through the lapse of cycles of time. We find families which in their dental development seem to the ordinary observer as widely separated as the East is from the West, but which a close examination proves to be near congeners.

What analogy, for instance, is there between the tapir, the last remnant of a great Eocene family, with its forty-two teeth in full use at one time, and the elephant, the final existing species of the almost extinct Proboscidians, having only six? And yet the gradations are plainly indicated. The molars of Tapirus have distinctly cone-shaped divisions of the crown. In the Dinotherium these are also found, but the separate denticles have united, and the cone-shaped prominences have become sections, each having its separate root. There are modifications of this change found in certain intermediate forms, which indicate the process of union of the separate teeth, showing that both dentitions had the same common source.*

* The near relation of most of the Pachydermata is indicated by the peculiar form of the nose or snout. In the hog this is prolonged and muscular, and serves it for explorations in the ground. In the rhinoceros it is an

In the fossil mastodon, named from the shape of its teeth (*μαστος*, a nipple, and *οδους*, a tooth), we find the same general form of dentition, but materially modified as to structure. Finally, in Elephas there is a yet further modification, the cone-shaped prominences being lost, and the separate denticles taking the form of dentinal plates. The structure, too, is changed, but there still remains the body of dentine surrounded by enamel, the whole being united by cementum, the modifications being those which would be induced by the gradual change of the denticles into dentinal plates.*

The six incisors of the tapir we find reduced to four in the mastodon, and of these the inferior ones are rudimentary, while the superior permanent pair, finding no lower ones with which they might occlude, grow to an enormous size and are developed into tusks, precisely as the incisor teeth of rodents grow to a great length when the opposing one is lost by accident.

In the Dinotherium it is the superior incisors which have become rudimentary, and the lower ones are in the same manner developed into great tusks, preserving their natural outward curvature. In the elephant the incisors follow the law of its congener, the mastodon, keeping the natural curve that is imparted to them by the shape of their sockets, and develop into those enormous tusks that distinguish the species. The study of the incisor teeth of the elephant is a fascinating subject, but the limits of time demand that I should confine myself mainly to a consideration of the molars. Dr. Miller, in the *Dental Cosmos* (vols. xxxii, xxxiii), has given a very valuable series of papers upon the development and certain pathological disturbances

---

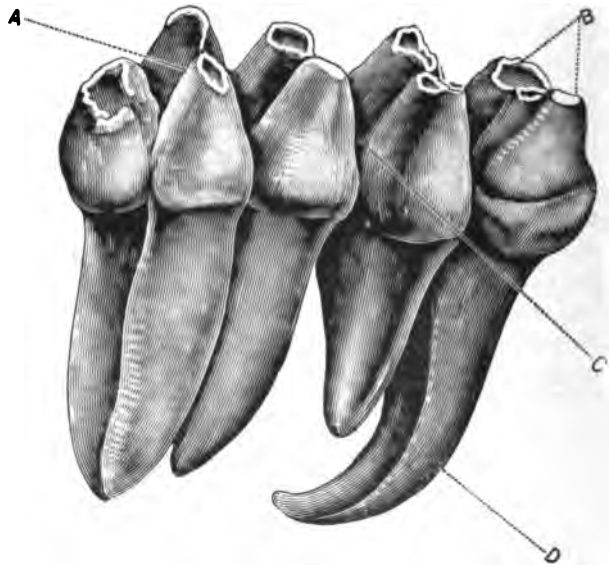
extremely flexible and pliant organ. In the tapir it is extended into a prehensile lip between the nostrils. The trunk of the elephant is but the prolonged and specialized nose of the hog.

*The human tooth, and that of the carnivora, consist of a body of dentine, covered with enamel in the crown and cementum in the root. If the human tooth were enveloped in the jaw as completely as that of the elephant, and were developed entire before eruption, it may readily be seen that the cementum would naturally extend up over the crown and cover the enamel. If now such a tooth be worn away until the dentine is reached, it would present almost exactly the characteristics of that of the elephant,—a ring of enamel inclosing a body of dentine, the whole enveloped by cementum. The elephant's molar is made up of a number of such separate denticles, bound together by the enveloping cementum, each presenting the same structural arrangement of tissues that the human tooth would do under like circumstances. The modifications that appear so extreme are, therefore, only the natural changes demanded by peculiar environments.

in the tusks of elephants, and to that let me refer the student who desires something further in this direction.

The dentition of *Mastodon giganteus*, of North America, is a distinct modification between that of the Dinotherium and the elephant. A part of the molars are succeeded by vertical successors, as is usual in the diphyodonts, so that there are, strictly speaking, true premolars. The denticles which make up the compound tooth follow the general law in mammalian tooth-structure, and are formed of a body of dentine covered by enamel, with a root envelope of cementum. (See Fig. 1.)

FIG. 1.



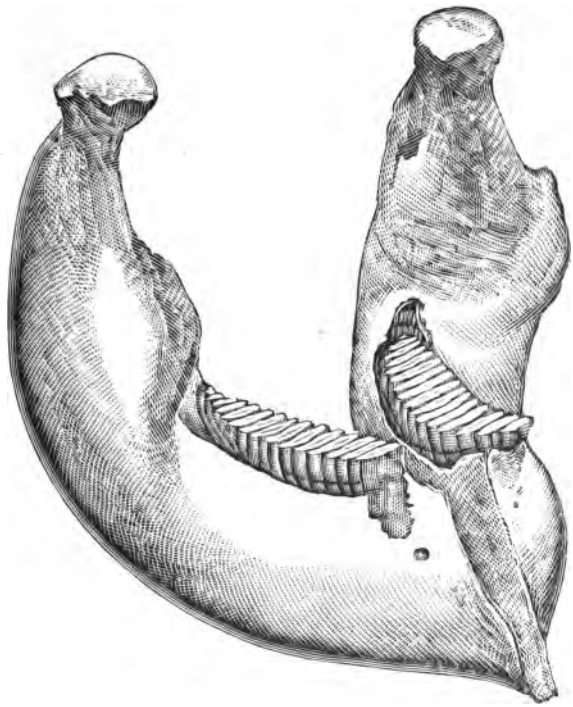
Tooth of *Mastodon giganteus*. *A*, posterior tubercles; *B*, anterior tubercles; *C*, depression between the denticles; *D*, long curved anterior root.

It may be seen that the structure of this tooth does not essentially differ from that of its congener, the elephant. If the different sections were consolidated by a layer of cementum, with a dentinal base, it would present nearly the same characteristics.

In the molar of the true elephant we find a remarkable modification, not only in structure, but in development. The succession, instead of being vertical, is horizontal. The formula is as follows: $\frac{2-2}{0-0}$ m. $\frac{6-6}{6-6} = 28$. Of the incisors two are deciduous, while the permanent ones form the great tusks. The molars of the elephant are of great proportionate size, especially those which make their appearance late in life. There is never but one on each side of the jaw in

full use at any time, and all through life there is going on the constant process of the shedding of this and the formation and advance of its successor from behind. (See Fig. 2.) The food of the elephant is of an exceedingly coarse character, and although the structure of the molars is such as to offer the greatest resistance to attrition, yet no other form of dentition would be sufficient for the long life of the animal.

FIG. 2.

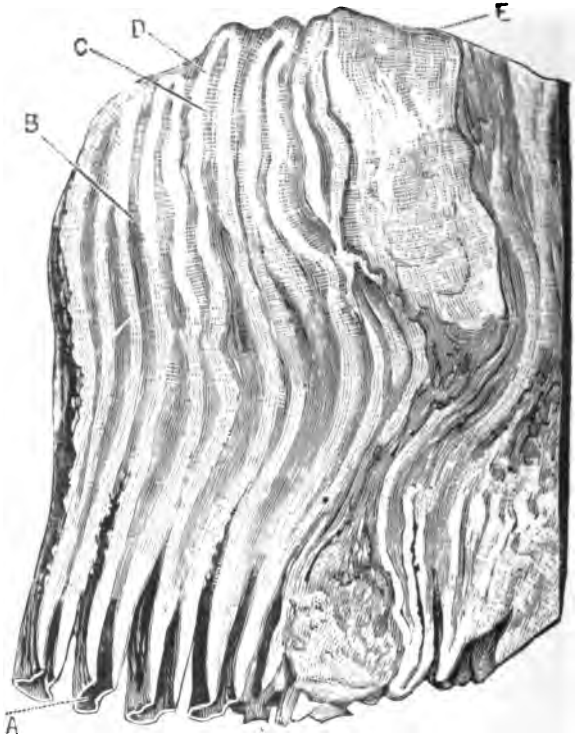


Lower jaw of Asiatic elephant, showing the single tooth that alone is in full use at any one time. The arc of the circle which they describe in their advancement is indicated, and the thickened ramus, which contains the germs of the plates of the succeeding teeth. The anterior roots have been formed and are in process of absorption, and the anterior plates are nearly worn away.

The germs of the six molars on each side of each jaw exist within the body of the maxillæ, and are developed in turn as the predecessor is worn out and shed. The structure is very complex, and is shown in the chart which I exhibit. (See Fig. 3.) The teeth are made up of transverse, perpendicular plates, which are developed separately within a crypt in the jaw. The size of these plates depends somewhat upon

the age of the animal. I exhibit to you the bisected jaw of an adult elephant, and as I open it you are able to see the crypt or chamber which contains these developing plates. Each of them consists of a body of dentine, surrounded by an enamel covering. The development is from these elevated points, as shown in this figure, which

FIG. 3.



Vertical section of molar tooth of elephant. *A*, open ends of dentinal plates, occupied by the pulp; *B*, cementum layer, binding the different plates together; *C*, dentine, inclosed within the enamel; *D*, enamel covering of plates; *E*, masses of cementum deposited between irregularly developed plates.

The tooth was not fully erupted, as the cementum covering had not yet been worn sufficiently to expose the enamel.

give to the forming plates a serrated appearance, not unlike that sometimes seen in the newly erupted incisors of children. These plates are open at the base, the cavity being occupied by the pulp-tissue from which the dentine is developed.

I have not had the opportunity to examine any fresh specimens

microscopically, so that it is impossible for me to say in just what manner the enamel is formed ; but as that tissue covers the whole plate, and as during the process of formation these are separated by a considerable space, it is probable that there is a separate enamel-organ for each one, and that this continues its function to the time when the plates coalesce into the complete tooth. In the rooms of the Odontological Society of New York there is the complete skull of an elephant, the jaws bisected as are some of those now before you, but in which the separate plates are in a more advanced condition than are these, and which therefore more fully illustrate the formation. In that the plates are perhaps three times as large as are the ones I now show you.

The growth of these plates continues until the enamel-membrane is exhausted, when there is, from the several divisions of the pulp, a further deposition of dentine, which forms a strong base for the whole, uniting the plates into a solid body. As the tooth after eruption is worn away, roots are developed, which serve to retain it in position. In its earlier stages it is held by the great body being within the socket.

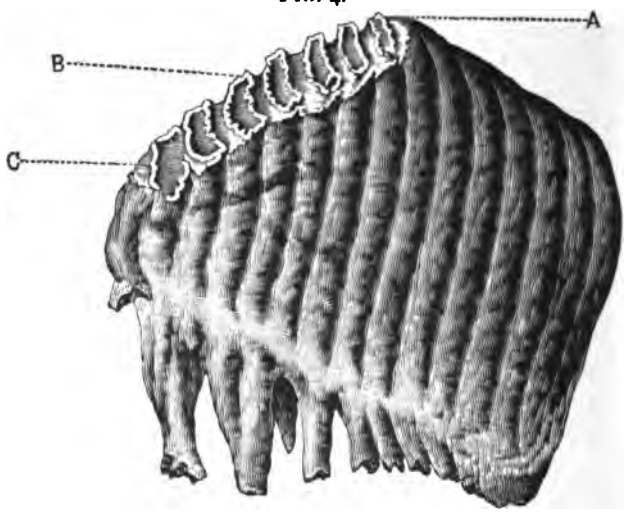
Coincident with the formation of the great body of dentine at the base, the enveloping membrane begins the deposition of cementum between and about the separate plates, thus uniting their upper portions into a solid body as the dentine unites the base, and in this manner is formed that complex structure illustrated in the diagrams exhibited, as well as by the numerous prepared sections upon the table before me. There is, then, here in the center of each plate, a body of dentine surrounded by a complete ring of enamel, and uniting the separate plates a stratum of cementum, thus presenting a yet more perfect arrangement of alternate dentine, enamel, and cementum than is found in the molars of the more common Graminivora. The several tissues offering a different degree of resistance, the teeth are worn into the alternate ridges and depressions that offer the most perfect surface for the proper comminution of coarse food.

As the deposition of the enamel about the body of the dentine in each separate plate proceeds, it assumes a wavy or undulating appearance. In the Indian elephant, and in the extinct Mammoth, the sides of the enamel-walls are parallel, thus causing the enamel to present the appearance of a complete and regular ring. In the African elephant the body of the dentine is much thicker in the center, and the enamel covering is expanded until there may be a complete separation in the middle of the ring, giving to the dentine a lozenge shape,

and to the enamel of each lateral half of the tooth a zigzag appearance. This is very apparent in some of the teeth now before you, and by this peculiarity of structure it is comparatively easy to determine to which species each belonged. In the Mammoth the plates are thinner and more numerous, as may be observed in this specimen.

In the procession of the teeth, a part of the posterior one comes into use before its predecessor is thrown off, for the whole process is a gradual one. While all the posterior plates are covered by the

FIG. 4.



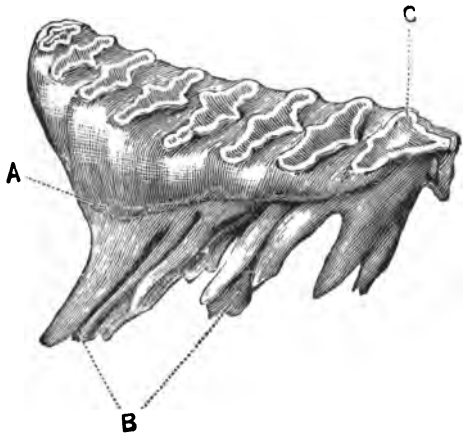
Upper molar tooth of Asiatic elephant. *A*, gum-margin and limit of erupted plates; *B*, enamel of the plates; *C*, much worn anterior plates, the roots of which have begun to develop. The line of the summits of all the plates, from *C* to the posterior unerupted ones, is nearly the arc of the circle which the tooth describes in its advance. If the roots were continued they would reach the apparent pivot or axis upon which the tooth seemingly turns in its progression. This provision brings the several plates into successive use.

gum and bony tissues, the anterior ones are in use. Here is a tooth in which it may be seen that the first three or four plates are considerably worn, while the posterior ones bear no such marks. (See Fig. 4.) In the lower jaw the forming teeth lie within the ramus, while in the upper they are within the retreating portion. In the course of their descent, therefore, following the general contour of the jaw, they describe the arc of a circle, instead of advancing in a straight line. This peculiar conformation, therefore, presents the anterior angle of the tooth first. As it gradually descends from above and reaches the plane of the body of the jaw, the tooth assumes a hori-

zontal position, and the successive plates are brought into full use. Before its eruption it stands almost at a right angle to its predecessor.

This peculiar method of progression forms one of the most striking characteristics of the dentition. It brings the plates successively into use, and by the time the last one is in full action the anterior ones are considerably worn away. The tooth will then have a wedge shape, and its anterior border would have but a comparatively slight hold in the jaw, were it not that this is compensated by the development of the anterior roots. (See Fig. 5.) In the course of the attrition the foremost plates become worn down to the dentinal base and are smooth,

FIG. 5.



Molar of African elephant nearly worn out, and showing the process of extrusion from the jaw. *A*, basal body of dentine; *B*, the posterior roots, developed as the body of the tooth is worn away, for the purpose of holding it in the jaw; *C*, anterior plates worn down to the dentinal base.

The anterior roots have commenced the process of absorption.

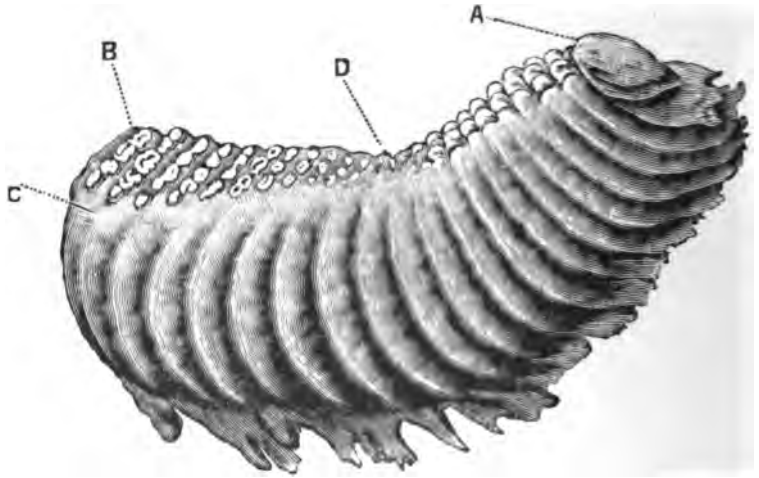
while the posterior ones yet have their enamel intact. This serves a useful purpose in mastication, for, as Owen remarks, the coarse limbs and twigs of trees are broken up and crushed on the anterior smooth plates, and thoroughly comminuted between the deeply ridged posterior ones.

When the tooth becomes worn down so far that the basal mass of dentine is seriously interfered with, the pulp seems to lose its functional power, and becomes exhausted. A reversal of the process now sets in, and there is resorption of the roots, until the advance of its successor crowds it forward and finally out of the jaw, the other taking its place. This process is repeated in the several teeth until the

last one appears, and this is sufficient for the needs of the animal until it dies from old age.

Each successive tooth presents an increased number of plates, and therefore lasts for a longer time than its predecessor. The sixth molar seems to develop more slowly than any of the others, and to have an unusual number of plates, which come into use with increasing tardiness. It would seem that in an animal that lives to an extraordinary age the plates are continually added, that the tooth may serve for mastication until death. Here is such a one. (See Fig. 6.) The animal to which this belonged was probably consider-

FIG. 6.



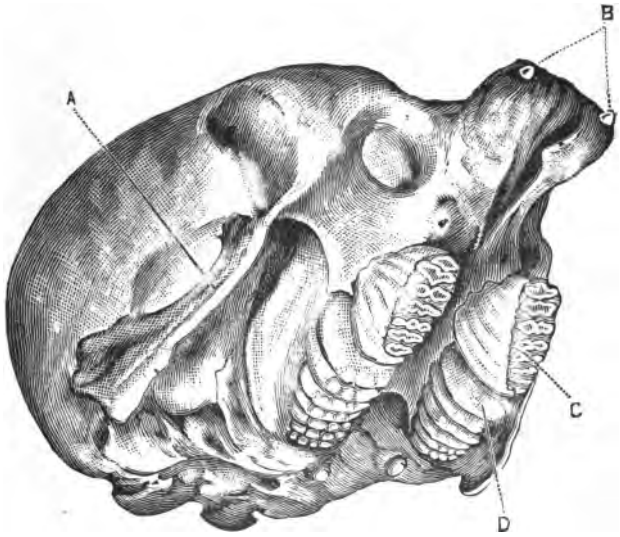
Lower molar of Asiatic elephant. *A*, posterior plates in process of formation; *B*, anterior plates, but little worn; *C*, gum-margin; *D*, plates just appearing through the gum. All posterior to this point were yet unerupted.

This tooth was evidently the sixth molar of an elephant that had passed the half-century of its existence. The crescentic shape is the arc of the circle which it described in descending. It is probable that as the anterior plates of the sixth or last molar are worn away, others continue to be formed at the posterior border as long as life continues. This one consisted of twenty-three plates. It measured fifteen inches in length, and weighed fourteen pounds in its dried state.

ably past the half-century mark, and yet it will be seen that there are many years of service left in the organ. While the first plates show the attrition produced by actual use, the last ones are yet in the process of formation, being quite immature. Of the twenty odd plates only ten have as yet been brought into action, and some of these are not worn down to the solid enamel. There was here a dental provision for many years of life.

I have here the skull of a young Indian elephant, in which the points of the deciduous tusks are but just discernible. (See Fig. 7.) The exact age of the animal I have not been able to determine, any further than by the appearance of the skull. But it will be observed that the tissue around the extremities of the tusks is in a cartilaginous condition, and that they had not yet protruded through the gum, which should occur between the fifth and the sixth month. Yet the first molar is completely erupted, and shows some attrition, so that it is probable that the young animal at death was three or four

FIG. 7.



Upper jaw and skull of a very young elephant. *A*, the partially ossified zygoma; *B*, the points of the unerupted deciduous incisors or tusks; *C*, the first molar, somewhat worn and showing the transverse structure of the plates; *D*, the plates of the second molar, covered by the gum-tissue and unworn.

The cementum between the plates has not yet all been deposited, and the alveolus was not fully developed.

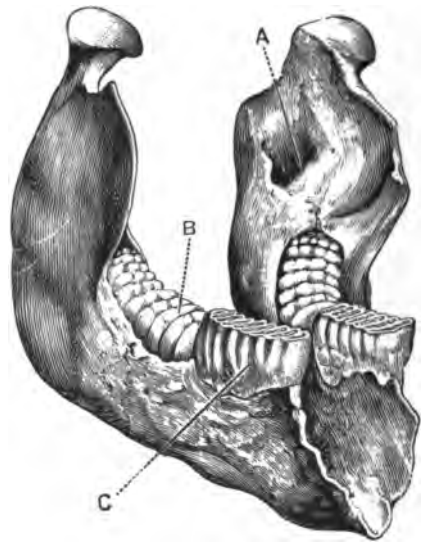
months old. The bones of the head, while firmly united, are yet very frail, and the zygomatic processes but partially ossified. The first molars, which cut the gum in the second week, with portions of the second, are plainly visible, and illustrate the formation of the teeth very perfectly.

In the upper jaw the first molar has six plates, while in the lower there are seven. The anterior plates of the second molar were not yet erupted, but they are completely united by cementum, while the

posterior ones are only held by the dentine at their base. The crypt for the third molar may be distinctly observed, although the plates are not sufficiently developed to be plainly seen. (See Fig. 8.) But the progression through the arc of a circle is beautifully illustrated, and the manner in which they are brought into use.

Owen says that the first molar, which is in complete use at three months, and is shed at about two years of age, usually has four plates, but in this specimen there are more.* The second molar, according to the same authority, has eight or nine plates, and that is

FIG. 8.



Lower jaw of very young elephant. *A*, opening in the ramus of the jaw, in which may be seen the germs of the succeeding plates; *B*, unerupted plates of the second molar; *C*, first molar, showing the anterior plates more worn away than the posterior ones.

The first teeth in descending move through the arc of a smaller circle than their successors, which make their appearance when the jaw is longer and larger, and therefore they necessarily contain a less number of plates.

about the number in this. He gives the length of the first molar at less than an inch, while in this specimen they are fully two inches. The second molar, he says, is about two and a half inches in its antero-posterior diameter. In this skull, although not fully

*I have not been able to make the number of plates, or the measurements of the teeth that I have examined, conform to those laid down by Owen. There is undoubtedly a considerable variation in individuals, and the different species do not follow exactly the same rule.

developed, it is more than three inches. It may thus be seen that there is no determinate number of plates in different individuals, but that it varies with the development.

The third molar has from eleven to thirteen plates, and is shed during the ninth year. The plates of the fourth molar number fifteen or sixteen, and it is shed from the twentieth to the twenty-fifth year. The fifth molar has from seventeen to twenty plates, and is probably not shed until the sixtieth year. Thus the first molar lasts but about two years. The second remains about four years, the third about the same time, the fourth eleven or twelve years, the fifth thirty years, while the duration of the sixth has not been definitely determined.

The plates of the sixth molar are from twenty-two to twenty-seven, and it is from twelve to fifteen inches in length. Owen says, in his "Odontography," that from its superior depth and length this should continue the work of mastication until the ponderous pachyderm has passed the century of its existence, but in his "Anatomy of the Vertebrates" he recommends further observation of this tooth in captive elephants. Mr. Corse, in his memoirs, has figured a seventh and eighth molar, and this would very materially add to the probable length of existence of the animal. But, accepting the number of plates in each successive molar as given by Owen, it is comparatively easy to tell the age of any elephant by the condition of the existing molars.

The advance in the grinding-teeth is accompanied by a like advance in the alveolus, which is developed with them. The tooth, as it emerges from the body of the jaw, is enveloped in the cancellous bone which forms the socket, and as it moves forward there is a corresponding progression of the alveolus which retains it, and which is finally resorbed with the roots of the teeth as they reach the most anterior point, thus allowing their final removal. At the same time there is a new formation about the succeeding molar, which passes through the same stages. It would be difficult to conceive how the progression of the teeth could be accomplished by any other means.

Although there are no deciduous molars, the elephant is provided with milk incisors, or tusks, which grow to the length of but a few inches, and are shed between the first and second years. They are almost immediately succeeded by the permanent ones, which, arising from persistent pulps, like the incisors of the Rodentia, like them continue to grow through life.

Abnormalities in the development of the teeth of these great mammals are not unknown. Especially are the incisors or tusks liable to

irregularities. Not infrequently is their direction changed, through some injury to the alveolus. I have more than once seen captive elephants, the points of whose tusks crossed each other. Occasionally one tusk is considerably more elevated than the other. To a certain extent they are movable in their sockets, and a continuous pressure upon them will change their direction and relative position. These irregularities may be corrected, when the animal is not too old, by any force continuously applied, precisely as the human teeth are made to assume new positions by artificial means.

In the rooms of the New York State Agricultural Society, at Albany, is the skeleton of the celebrated Cohoes mastodon, which was dug up some years since. The inferior jaw shows the loss of one of the molars, probably through some accident, and the alveolus has completely closed over the place. Probably the animal was not a very old one, but there are no signs of another molar beneath it. If it were possible to make a section of the jaw, perhaps something of interest might be discovered. I noticed this peculiarity some years ago, but have never seen it mentioned by any author. I have not had the opportunity to make a very thorough examination of the case, something which I propose to do in the near future.

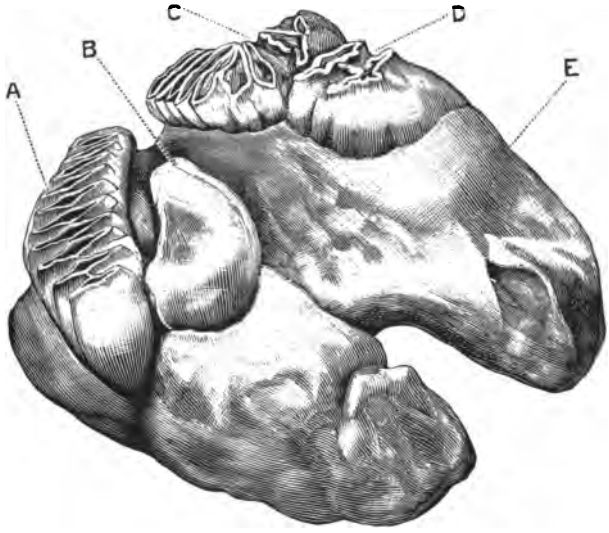
The most singular malformation that I have ever observed in any animal, appears in the upper jaw of the celebrated elephant "Jumbo," which was killed in a railroad accident a few years since. This was an African elephant of prodigious size, although it had scarcely reached the age of full maturity. Captive African elephants are rare, the most of those in menageries being of the Asiatic species. The skeleton of "Jumbo" was mounted at the Natural Science Establishment of Professor Henry A. Ward, of Rochester, N. Y., for Barnum & Bailey, the showmen proprietors of "Jumbo" when alive, and is deposited in the rooms of the Society of Natural Sciences, in Central Park, New York City. I visited the skeleton a few months since, and called the attention of the superintendent to the many points of interest it presented, suggesting the advisability of an examination by making sections of the jaw. I was informed that as it was not the property of the society this could not be done, but they would endeavor to obtain the necessary permission of Mr. Bailey to do it.

I exhibit here casts of the upper jaw, obtained when the skeleton was mounted in Professor Ward's establishment. (See Fig. 9.) It will be seen that the aberration was remarkable. There are two molars in each jaw, fully erupted. At his death "Jumbo" was about twenty-five years of age, and this would make of these the fourth in

succession, provided the usual rate of progression had been followed. Yet Owen and Corse say that the fourth molar has about fifteen plates, while these have but ten. The same authorities give the length of the tooth at about eight inches, and that is the size of these. So we may probably accept them as the fourth molars.

None of the visible teeth occupy their normal positions, nor are any of them of the usual form. The right molar is nearest the normal,

FIG. 9.



The upper teeth of "Jumbo," the African elephant exhibited with Barnum's circus a few years since.

A, the fourth molar in succession, comparatively regular but occupying a position outside the normal, and standing at an angle of nearly thirty degrees. The tooth is curved, the buccal aspect being the convex surface.

B, a few of the plates of an abnormally developed fifth molar. This tooth is as irregular in structure as in position. The plates run nearly longitudinal to the antero-posterior axis of the tooth.

C, the irregular left fourth molar. The posterior plates of this tooth stand at an angle of nearly ninety degrees to the anterior ones, the concave surface being the lingual aspect.

D, a few irregularly developed plates of the left fifth molar.

E, the alveolus, probably containing the undeveloped plates of the fifth molar.

yet this is curved considerably, the convex surface being outward. Instead of lying longitudinally in the jaw, it stands at an angle of about thirty degrees. The plates, however, are normally developed.

Lying inside the posterior half of the tooth, and at nearly the same angle with the jaw, are the first five or six plates of the succeeding molar. In the plaster cast it is difficult to determine just what was

the situation, but the plates were markedly distorted, some of them lying almost longitudinally, instead of transversely. Those which were not yet fully developed were on a still different plane, the posterior half of the tooth standing at an angle to the rest. Only a section of the jaw would reveal the exact manner of their formation.

The left fourth molar presents a still greater anomaly, the convex side being inward. At about the junction of the fifth and sixth plates the tooth makes a sharp bend, the posterior plates standing at an angle of nearly ninety degrees to the rest. The developed portion of the left superior fifth molar presses against the deflected posterior plates of its predecessor, in such a manner as to tend to turn it upon its axis. The plates of the fifth molar are irregularly developed, the first and second being nearly an inch apart, and the others separated by a very wide layer of cementum.

The general aspect of this case is that of the irregular development of the fifth molar without the removal of the fourth, and the malposition of all of them. The fourth molars are worn, the anterior plates being almost reduced to the dentinal base, but there has not apparently been the usual absorption that should take place at this time. The alveolus, especially upon the right side, has been extraordinarily developed, as might naturally have been expected. Those who closely observed the animal in life, could not fail to mark the asymmetry in the jaws. I myself noticed it long before I had an opportunity to study it.

What was the cause of this irregularity? The elephant, although not born in captivity, was captured when very young. He was of extraordinary size, and his whole bony system was unusually massive. He had always been of a peaceful disposition, and had not, until his death, met with any serious accident.

A duplicate cast of the jaw was sent to Professor W. H. Flower, director of the Natural History Department of the British Museum, author of "The Osteology of the Mammalia," etc., and perhaps as competent authority as now lives upon the subject. He gave his opinion in a letter, in the course of which he says,—

"The irregularity has arisen evidently from his food not having sufficient gritty particles in it to cause the required and normal wear of the front ones, so that these were not gotten rid of, as they ought to have been, before the others came up to take their places. Elephants in menageries constantly suffer in this way. They ought to have a little sand mixed with their food."

Notwithstanding the eminence of the authority, I am inclined to

take issue with Professor Flower upon the etiology of this case. I would not assert that the lack of attrition was not a factor in the result, but I cannot believe that alone it is sufficient to account for the aberration, for the following reasons:

First. It is not absolutely certain that the procession of the teeth in Elephas is entirely due to their wear. Certainly that has something to do with it; but if the animal was entirely fed on food that produced no abrasion of their surfaces, it seems to me there can be no doubt that they would be shed. Probably the time might be deferred, but the posterior molars would certainly develop, and to do this the anterior ones must be removed. We know that in the human subject the deciduous teeth are removed with the development of their successors, and that when there are no permanent germs the first ones are usually retained. This would indicate that the absorption of the deciduous roots is due to the development of their successors.

Second. With the wearing away of the crowns there is a development of the roots of the worn teeth in elephants, so that their removal does not depend upon mere attrition,—that, indeed, inducing exactly the contrary tendency. They are absorbed, as are the deciduous teeth in other mammals. It is a part of the mysterious process of nature, influenced by the pressure of the succeeding tooth. That in elephants the eruption and advance is horizontal instead of vertical, does not necessarily change the conditions. Lateral pressure is as effective in inducing resorption as is vertical.

Third. I cannot conceive that the lack of wear of the teeth should affect the structure of their successors. Their form might possibly be changed, as the result of undue pressure upon the formative plates; but this would naturally result in their being crowded together, whereas in the teeth of "Jumbo" the plates are separated by an undue amount of cementum.

Fourth. The relative proportion of the different tissues is completely changed, thus showing that the development within the crypt of the jaw in the early stages was interfered with. Even though the preceding tooth was not advanced it would not induce this aberration, because the anterior plates are formed before the normal time for the advance of its predecessor has arrived.

Fifth. The fourth molars, in the case of "Jumbo," seem to have been considerably worn. The fifth molars are occupying a place anterior to that which belongs to them. They have, it seems to me, unduly advanced. The general appearance is that of teeth that have irregularly developed. It is quite impossible to determine the struc-

ture of the posterior plates without making a section of the jaw, as they are yet enveloped in the bone.

Sixth. It is difficult to conceive of food that would cause greater attrition than that which is usually supplied to elephants in captivity. In their native condition they subsist largely upon succulent grasses and shrubs, which in their green state are easily masticated. In captivity elephants are mainly fed upon dry hay, than which few foods could wear the teeth faster, and desiccated grains, the siliceous covering of which must cause great wasting of the tissues of the teeth. It would appear, then, that the amount of attrition in the teeth of a captive elephant should be much greater than in those of one which lives in a state of nature.

In view of these facts, it does not seem to me reasonable to suppose that this abnormality could be caused by lack of gravel in the food of "Jumbo." I should rather attribute it to some injury which he had sustained, and which interfered with the development of the tooth-plates. It might be sufficient to accomplish that without being externally visible. The reversed convexity of the teeth, the change in their morphology, the abnormal development of the alveolus, the mal-arrangement of the tissues, the distortion in the tooth-plates, all seem to point to this as the predisposing cause. It is possible that the jaw itself is but partially developed. It seems short for an animal of such extraordinary size.

Nothing but an examination of the forming plates, and of the germs of the remaining teeth, will satisfactorily solve this very interesting problem, and it is very much to be hoped that some competent New York comparative dental anatomist will receive the necessary permission, and make a careful study of this unique case. The skeleton will be found in the rooms referred to, at the right in the main entrance hall.

DISCUSSION.

DR. GEORGE E. HUNT: I would like to inquire whether it is possible to distinguish which molar is in use in the living elephant. When we get to the fourth, fifth, or sixth, is it possible to distinguish except by an examination of the skull, and is it possible by an examination of the skull without getting into the crypts that contain the germs of the later teeth?

DR. BARRETT: The number of plates determines that point, and while a portion of the teeth may not be developed, may still remain below the alveolus, yet a comparison of the two will show.

DR. HUNT: I thought you said there was a dispute between authorities on that subject.

DR. BARRETT: Owen says there are only about four plates in the first molar, and yet I have one with seven. But if I should find a tooth with eight, or nine, or ten, I should say it could not be a first molar.

DR. TRUMAN: I was interested in the paper. It does not afford much room for discussion. There are new points brought out by Dr. Barrett; at least they are new to me. One where he positively asserts as a fact,—and one which I do not feel is absolutely determined,—and that is in regard to the three anterior molars. He affirms that they are not deciduous. I think authorities are not decided on that question. I should like very much to have Dr. Barrett state upon what ground he determined that question. Of course I understand they have no successors in the sense of premolars, but they seem to me to have a deciduous character.

DR. THOMPSON: This paper of Dr. Barrett's is interesting. There is nothing to which I could take exception except one or two points in regard, first, to the comparison of the incisors with the incisors of rodents. I don't think they are analogous. Their functional difference is too great. They are produced and developed for different purposes. The incisor of the elephant is developed, as we know, for purposes of uprooting trees and plants for food, and for battle purposes as weapons, and it would not be possible for them to be kept down by wear. They are not intended to be used for the division of food, whereas the incisors of rodents are used for that purpose, and are worn down by wear in use in cutting plants.

Another matter in regard to this abnormal specimen. I am inclined to think the abnormality is produced entirely by lack of wear, and that it has a direct relation to the reproduction of the successive teeth. It seems to me, in the specimen, that the lack of wear has not disposed of the preceding tooth in time for the reproduction of the succeeding tooth, and the latter has begun to be produced before the other tooth was out of the way. For that reason it has interfered not only with the development of the first tooth, but also of the second, and in that way it looks as if the deformity was altogether due to lack of wear and to lack of use. I think Dr. Barrett is wrong in regard to excessive wear in captivity. There is certainly lack of wear in captivity, from the restriction of the animal to particular foods, and the absence of others which it does not get and would obtain in freedom.

DR. PEIRCE: I was much interested in the paper of Dr. Thompson

last evening, and also this morning in Dr. Barrett's. They were instructive, and give us much food for thought, though, as Dr. Truman has said, not much for discussion. The fact of considerable importance to us is that the arrangement of these folds of enamel in the teeth of animals indicates the excursions of the lower jaw. It is interesting to note the correspondence between the organs and the function. Wherever we have the plates standing as these do in the elephant, at right angles to the long axis of the tooth, we must have an antero-posterior motion of the mandible.

It is that beautiful adaptation of the parts to use recognized in the motion of the jaw back and forward, bringing these plates into their greatest service, which is of especial interest. Where the plates are standing at different angles, as in the W pattern, we not only have an antero-posterior but a lateral motion, the excursions of the jaw describing almost a circle, and giving us a most beautiful adaptation of the parts to the use.

Regarding the irregularity of this cast of "Jumbo," I am quite inclined to coincide with Dr. Thompson in believing that it was the persistence of the first molar which caused the curvature of this molar. In the development of this tooth the want of room would have a tendency to throw it out of line. There is another matter that would be of great interest for us to know, with the arrangement of these plates and teeth in this irregular condition : whether "Jumbo," to get the full utility of those teeth in that condition, was known to modify the excursions of the jaw, whether that would be possible to ascertain, also whether he had any other motion than the normal one of the elephant, forward and back. The lesson this teaches is that the formation of the tooth indicates the excursion of the jaw and the food habits of the animal.

DR. TRUMAN : I would like to call Dr. Barrett's attention to the change from the tooth of the mastodon to that of the elephant, from the absolutely covered enamel points to these plates of enamel. It seems to me that this evolution is an interesting fact, the change probably produced by the use of foods from the period of the mastodon, when it lived largely on limbs of trees and what might be termed a coarser food, to that of the elephant with different conditions.

DR. BARRETT : In the first place, in the consideration of the procession of the teeth of elephants, the question is raised, May these not be deciduous molars? A deciduous tooth is a tooth which is thrown off for the purpose of being succeeded by another, of a different character. It is one which belongs to a special condition of

dentition in dentition and development. For instance, in the Graminivora we have deciduous teeth, they being removed and succeeded by vertical teeth of another morphology. In elephants there is no such succession of teeth. One tooth is shed and succeeded posteriorly by another of like form. There is no development, there is no adjustment beneath the deciduous tooth of a permanent successor, and consequently they must be of the same character. The structure of the tooth and its successor is identical. As a consequence, I do not see that they can be considered as deciduous teeth. We know that the development is like that of the permanent molars in Homo, and therefore we may consider them all as permanent teeth, because they have all the same characteristics, and must be either all permanent or all deciduous.

The incisors of elephants have not the character and are not developed like those of the Rodentia. The office does not change the character of the tooth. That is but incidental. The tooth being erupted, it may be put to any use. We may chew gum with ours, or tobacco, or tough beefsteak; it makes no difference with the structure of the organ. All teeth with persistent pulps will continue to grow and develop until they reach the final limit, which comes only with the loss of vitality, either in the tooth or the animal. The curvature, if they be not straight, will depend upon the alveolar socket. If that be curved, it will be reproduced in the tooth. In the incisors of the Dinotherium this curvature is toward the earth. In the elephant and in the cuspids of the wild boar it is away from the earth.

Regarding the cause of the irregularity in the molar of "Jumbo," I fully comprehend the weight of authority which may be against me, but I must do my own thinking, and my opinion is based upon that alone. In its native state the elephant lives largely upon succulent food. I do not mean this in the sense in which young asparagus is succulent. I mean that the green, sappy boughs which form its food will give much less attrition than the dried hay which forms its principal pabulum in captivity, and the siliceous grains which wear out a tooth faster than almost anything else can. It does not seem to me that any other condition can be the case than that the wear of the tooth must be greater in the captive elephant than it is in its native state.

One speaker said the anterior plates were developed first. True, and that sustains my position. I show you in this case that the anterior plates of the tooth are very widely separated, which would not be the case if the aberration were due to pressure alone. It

would tend to condense the plates and bring them into closer apposition. Yet it is in these anterior plates that you find the wide separation of the enamel rings.

Did "Jumbo" have added excursion of the jaw? I do not know. Of course the poor fellow is gone, and we cannot determine that; but I have studied the skull as thoroughly as I could in the limited time at my command, and as well as I could determine by the condyles of the jaw there was no difference in this respect between him and any other elephant that I have ever seen. I hope to have the privilege of making or seeing made sections of the jaw.

The evolution of the tooth from the mastodon to the elephant is the last point to which I desire to call your attention. I have here the tooth of a mastodon. It will be seen that the enamel covers the whole surface instead of being divided up into ridges, but there is the same relative position of the dentine in the center. In the course of development by the wearing down of the prominent tubercles, an analogous arrangement or appearance to that found in the elephant must be produced, if we except the peculiar deposition of the cementum. Cut off the top of each tubercle until you have reached the body of dentine, and there will be as complete a ring of enamel as there is in the elephant, and this will surround and inclose a central body of dentine. Now imagine the individual denticles separated from each other, and they become the dental plates of the elephant; weld them together again by a deposition of cementum, and there results the exact structure of the molar of the elephant. In the long process of development there has been brought about the precise structure as it is found in the Proboscidians of to-day, and in the seemingly exact manner that would naturally be induced by changes in environment. The attrition produced by changes of food might in the course of time produce such a modification as would give the ring of enamel and the central body of dentine, and finally the deposition of cementum between the plates and upon the crown of the tooth, instead of its confinement to the root alone.

It should be remembered that tooth development takes place within the body of the jaw, and nearly its whole substance is enveloped in the alveolus even after its eruption. From the peculiar anatomical construction of the maxillæ and their vascularity as compared with other bones, these changes might more readily occur in the teeth than in almost any organ of the body.

DR. PEIRCE: Do you not recognize the fact that in development or early life these depressions were filled up with cementum?

I think this is the fact in the newly formed tooth; these depressions are all filled with cementum, and that being much softer, it is prematurely worn out.

DR. BARRETT: I do not know that it is the fact. The tooth is not developed in that way. Of course I cannot speak authoritatively, because I have never known, neither will any one ever have the opportunity to examine one of these teeth in its developmental state, because the animal has long been extinct. But there is no evidence, so far as I know, that the depressions between these dental plates were ever filled with cementum. There is no more trace of any connection of cementum with the enamel plates than there is upon the enamel on the Carnivora.

SECTION I.

PROSTHETIC DENTISTRY, CHEMISTRY, AND METALLURGY.

VERBAL REPORT BY W. B. AMES, CHAIRMAN OF THE SECTION.

SECTION I has had very little matter offered this year. We have no papers to report. Dr. George Evans will describe a process of enameling the surfaces of gold crowns.

As Dr. Evans is not now present, we will offer the only other matter that we have, which comes under the head of chemistry particularly: a new oxyphosphate, the oxyphosphate of copper, which I have personally brought out within the last year, and I only offer it as a new thing for what there may be in it, and will pass samples of it about so that you can see what the nature of it is.

It is a mixture of black oxide of copper and phosphoric acid, making an oxyphosphate similar to the other oxyphosphates; only, instead of oxide of zinc, black oxide of copper is employed.

In addition to this, we desire to recommend that Dr. Melotte give a clinic, if any clinics are held, demonstrating the use of a new fusible metal which fuses at a lower heat than those most in use; also, a method of getting an accurate bite for bridge-work which Dr. Melotte is prepared to show in the way of a clinic, if an opportunity is offered. We also wish to offer the following resolution:

"WHEREAS, Section I has been unable in recent years to obtain sufficient matter to make a proper report; and whereas, it is the opinion of the Section that it is properly entitled to papers on crown-work, bridge-work, and orthodontia; *Be it resolved*, that hereafter all papers on these subjects be submitted to Section I."

DISCUSSION.

DR. LOW : I would like to ask a question as to the advantage of oxide of copper over the oxyphosphate of zinc?

DR. AMES : I offered it as something new and something that has some practical value in it. The result of the compound is a very hard cement. It seems to have a density and texture superior to any cement I have ever seen. Another advantage is that it can be used of a different consistence than other cements. Where we get the best results from the ordinary cements by working them at a putty-like consistence, with this we get the best results in using it in a fluid condition, so that if it has any value the use of it in this fluid state is a decided advantage in some work. It can be flowed in a cavity and allowed to become hard, and the best results are obtained in using it as above stated. I have set crowns and bridges with it, and it allows all crown- and bridge-work to be forced absolutely to its place, and yet you use the cement under the best conditions.

DR. LOW : I desire to ask a further question, as to how rapidly it sets as compared with the oxyphosphate of zinc?

DR. AMES : It sets very rapidly indeed. In the cold state it allows of considerable time for manipulation, working it on a cold slab ; but as soon as the temperature is changed, giving it the temperature of the mouth, crystallization starts in, and it is completed very rapidly, after being inserted into the cavity of the tooth. That part has to be done very quickly, because as soon as you allow it to take on the heat of the mouth, crystallization is very rapid. There is a great difference, in working it, between the behavior in winter and summer ; the different temperature makes a great difference. A cement that is prepared for winter use is hardly proper for summer use, I find.

DR. H. A. SMITH : I would like to ask Dr. Ames a question, since I have had a little experience in the use of oxyphosphate of copper. I would like to ask if he has found it is more irritant to the tissues than the oxychloride?

DR. AMES : I think it is, a little.

DR. SMITH : Markedly so?

DR. AMES : In some cases there seems to be a marked irritation, in others none.

DR. H. A. SMITH : I have observed that the oxyphosphate of copper is quite irritant to the soft tissues with which it comes in contact. I find it takes a much longer time to set than oxychloride.

The great objection, however, is its color; it is intensely black. It has its uses, however. I think in the setting of difficult cases in crown- and bridge-work it is valuable. It remains plastic for a sufficient time, and then becomes very dense and hard, and possibly to a large extent it is an insoluble cement.

DR. EVANS. In regard to the mixing of a cement of oxyphosphate of zinc and the cement presented by Dr. Ames, the difficulty of heat affecting cement can be overcome in a very simple manner, and it is this: to use, as a slab for mixing, a square glass bottle,—for instance, an eight-ounce bottle. Fill the bottle with ice-water, and you will always in summer have about the same temperature to mix your cement in as you have in winter, and you will overcome this trouble. In mixing oxyphosphate cement in winter, probably the cement will be at a temperature of about 65°, and in summer we have a temperature of about 90°, a difference of nearly 30°. That will materially affect the setting of the cement. A bottle forms a very good slab to mix cement on, from the fact that you can hold the head of the bottle with your left hand and steady it, and use your right hand to mix the cement. I take an eight-ounce bottle, fill it with ice-water, and place on one corner toward my left hand the acid, to the right the powder, and on the other side, between the two, the bridge or crown. I leave these in position and go to the patient and prepare the mouth, and I then go to my bottle or slab and mix the cement, insert it in the crown, replace on the bottle, and then go back to the patient to see that everything is right; and I then take up what cement I need, fix it in the tooth quickly, pick up the bridge, adjust it in position, remove the napkin and occlude the teeth, keeping them so until the cement is set. If you are interrupted in the mixing of the cement, you can stop a moment; in fact, a cement that will set so quickly as to hardly give you time to carry it from your slab to the mouth, you can keep soft on this bottle filled with ice-water for a considerable time.

SECTION I.—Continued.

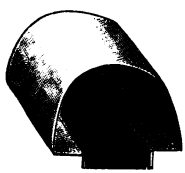
Enameling Gold Crowns..

REMARKS BY GEORGE EVANS, OF THE SECTION.

A METHOD by which the labial surface of a first or second bicuspid gold crown can be veneered with porcelain, or enameled, is most desirable.

The process which I present I have tested practically only to a limited extent, and explain it by request. It possesses the merit of forming a strong facing, and one which adheres firmly to the metal. In brief the process is as follows:

The gold crown should be constructed of a high grade of gold plate, nearly or entirely destitute of copper alloy, or it should be made of gold and platinum crown metal. After the crown is fitted to the natural tooth, the portion of the exposed labial surface to be enameled is outlined with a sharp instrument. The crown is removed, and the part within the mark thinned with a corundum wheel, and then perforated with a drill at regular spaces. The crown is readjusted, and the portion to be enameled is bent inward or burnished against the surface of the natural tooth. The crown is then removed and moistened, and glass enamel placed over the indented surface in sufficient quantity to cover it. The crown is then placed in a muffle, and with a flame directed against the closed end is heated to a point sufficient to fuse the enamel. The crown when cool is removed, more enamel applied, and again baked. The surface of the enamel is next ground with corundum points or wheels, and its surface leveled, and flaws or pits opened up. These are then filled with more enamel, and the crown again baked. After the baking, the enamel is ground to the level of the crown and given the proper contour. The enamel and gold are then finished with sand-paper



disks. A thin mixture of the enamel is then applied with an artist's brush, and the final baking given, which should be at a light-red heat, or as high as the gold of the crown will permit. In this last baking the open end of the muffle should be turned toward the operator, so that he can see the exact heat applied.

DISCUSSION.

DR. THOMPSON: I would like to ask the gentleman if he can control the shade perfectly?

DR. EVANS: I apply the enamel in successive layers. There is the secret of success in the operation. I fuse down each thin layer at a very great heat, giving the enamel the contour of the crown in the last one; then with the artist's brush a very thin coating of enamel is placed over the surface, the final baking is given, and it comes out smooth and beautifully glazed. The material I use is that of Timme & Co., and they have different shades. The enamel is not equal to our best-made artificial teeth in appearance, but it is less objectionable than gold.

DR. PATTERSON: I have been very much interested, because this is something we have been looking for. I would like to ask the doctor how he can get it to the proper fusing-point without the danger of melting the gold?

DR. EVANS: That is easily answered. I turn the open end of the muffle toward me, and direct the flame to the back of the muffle, so that I can see; and then it will be necessary for the gentlemen to make a crown or two for practice. You cannot learn to handle one of these crowns without practice, and if you undertake to enamel one for your patient first, you will probably spoil your crown. Practice first, and then you will succeed. In making a crown of this kind, I would use from three to four per cent. of platinum.

DR. BARRETT: I would like to ask wherein this differs from the process presented by Dr. Timme last year.

DR. EVANS: Dr. Timme simply takes a crown of gold alloyed with copper and places the enamel on the surface; he scratches the labial surface of the gold, and applies this enamel. That will chip off. There is no secret to it, and there is no result in an artistic way that is satisfactory. This is to overcome the objections to his method. In this case the labial surface of the crown is bent inward, and the enamel is anchored right to the crown and fastened on the inside besides.

DR. THOMPSON: That was done last year.

DR. EVANS: I have not seen it, neither has it been on record in any dental journal, and I think I read every article in every journal that is published. I was at Saratoga and did not see that operation, and I am sure I would have heard of it by this time from the many gentlemen here and at other associations where I have shown this crown, if Dr. Timme had introduced this process. Honor to whom honor is due. The man who has presented a method almost similar to this is Professor J. Bond Littig, of the New York College of Dentistry. It will be found in the reports of the Odontological Society. He there presented a similar crown, but his material was not anchored through the platinum, and it is more liable to chip off; and again, he did not fuse it in the successive layers in the manner in which I have done.

DR. MCKELLOPS: I saw this brought out at Berlin by Dr. Cunningham. He was doing enamel work of this kind. He was putting it on plates. I would like to ask Dr. Evans if this is a secret, or does he give the manner of making this enamel?

DR. EVANS: I tell you it is not my enamel; it is Timme & Co.'s enamel. There is nothing secret about it.

DR. MCKELLOPS: Dr. Cunningham had a demonstration of different plates and had several specimens, and put it on to most anything. What it is made of I do not know. He said he would give it to me. I told him I was in the habit of going around among the profession of this country, and I had some experience in using enamel, and I would like to get it. I could not get the secret out. He accomplished the same result, and did it with alacrity.

DR. EVANS: I think we shall have to go back farther still. We shall have to go back to our friend Dr. Herbst, who visited us and presented so many things that were interesting a few years ago. In fact, I got my idea of this muffle from him. He took glass buttons and various things and formed this enamel, and produced the results just as I show you to-day. I claim nothing in this as original. I am introducing it to you to advance the subject of prosthetic dentistry. It is all mechanical, and you can bring your results as you wish and place them as you wish, but to Dr. Herbst belongs the honor of this little muffle and these glass enamels, as well as of a great many other things.

DR. GUILFORD: I wish to confirm what Dr. Evans has said. The credit for this work originally belongs to Dr. Wilhelm Herbst. When his brother George was in this country studying dentistry, he exhibited to me and others a method of grinding and pulverizing crimson glass.

and fusing that upon the neck of a porcelain tooth in such a way as to imitate the color of the natural gum. Without removing the enamel from the surface of the tooth, he moistened it with a little water, sprinkled his pulverized glass upon it, put it in his muffle, applied the blow-pipe and fused it. It did not produce a handsome gum color, but it was a great deal better than white. When Dr. Wilhelm Herbst was in this country he gave an illustrated exhibition of his method of making glass fillings. The cavity was prepared without undercuts, and two impressions of it taken in warmed shellac or modelling composition. From these two models of the cavity were produced with plaster and sand. In one of them pulverized glass of proper shade was fused to nearly the size and form of the desired filling. It was then removed, placed in the second model or investment, more glass added, and the fusing completed.

The different methods of making glass or so-called porcelain fillings have originated from that beginning. The matrix of plaster and sand is no longer used, having been properly succeeded by one consisting of heavy pure gold or gold and platinum foil burnished to the form of the cavity. This light metallic matrix allows the glass to be fused in it over the flame of an ordinary alcohol annealing lamp, thus saving much time and labor.

Inasmuch as pure gold fuses at about 2000° F., care must be exercised in exposing it to a naked flame, especially of gas; but when the gold is alloyed with a slight amount of platinum, its fusing point is greatly raised.

Glass is used in the making of these fillings, owing to its readier fusibility than porcelain body.

DR. MCKELLOPS: As far as enameling is concerned, the originators of that were the watch-makers. That has been done, for God knows how many years.

A PLEA FOR AID FOR DR. DWINELLE.

DR. TRUMAN having risen to a question of privilege, and having been granted the floor, said,—

Mr. Chairman, I have been affected for a long time by the changing character of human life. The constant mutations that are met with are always impressive; but as individuals grow in years and the time for the parting of the ways comes, we necessarily feel these more deeply. They may not be made by death, but by the constant fluctuations that are likely to occur in financial conditions. I have

been painfully affected by this during the past few months. One of the most distinguished members of our profession in the United States in past years, one who stood probably higher than any man in this room, is to-day an inmate of a Masonic Home in Philadelphia. To-day it becomes necessary to aid a fellow-member of this Association, one whom we have all honored in the past, one whom I recollect very well when myself but a stripling in the profession of dentistry, one who has done more perhaps for its advancement than any man of his age now living. I allude to Dr. W. H. Dwinelle, of New York city. The parting of the ways has certainly come to that life. He stands to-day between the seemingly assured competency of the past and a future clouded by age and insufficient means. Now, it does seem to me that when such a man reaches this period, no matter what the cause may have been, it is our duty to do something in return for his great services to the profession. Dr. Dwinelle has been taken by a few friends to his old home in Cazenovia. Under the care of a sister there he will remain possibly until the end comes to him, as it comes to all of us sooner or later. In view of this fact, a few gentlemen, members of this Association, have united in an effort to raise a permanent fund for his relief, and appointed a committee to take charge of any moneys that may be raised. A sum to meet temporary needs was collected in New York for his benefit. Now it is proposed that two funds be raised, one to which any individual may subscribe, giving a certain minimum amount, say five dollars yearly, more if they see fit, and another fund in which parties may, if they shall prefer, give any amount they desire and finish up the matter. These funds will be placed in the hands of a committee. That committee consists at present of Dr. Perry, of New York, who will take charge of all moneys subscribed, Dr. Allport, of Chicago, and myself in Philadelphia. All I desire this evening is simply to call the facts to your minds. Dr. Dwinelle is perfectly willing that this explanation should be made, and he would regard this as a testimonial to the work that he has accomplished. Therefore it is in no sense a humiliation to him, but an effort on our part to pay in small measure that which is his due. I feel it more a pleasure than a duty to stand here in your presence and talk of this man, whose work has been so fruitful of good in his generation.

DR. ALLPORT: As I am a member of the committee referred to by Dr. Truman, I will say that while I am very sorry that the occasion has arisen for my services in the direction named, I shall be very happy to do anything I can for our old and esteemed friend, Dr. Dwinelle.

When I was told by a gentleman from New York this morning of his condition, and what they had done for him there, I replied that while Dr. Dwinelle lived in New York he belonged to us all, and that we should claim the right to contribute our portion toward making him comfortable in his misfortunes.

Dr. Dwinelle should be considered as one of the old and most esteemed fathers of dentistry. He has not only contributed richly to its literature, but he has conceived and developed many useful ideas in practical dentistry. Few men have done more for the advancement of its science and practice than he has, and it would be a shame for any one of us, who have the means to do so, not to contribute his mite of five or ten dollars, or more, to make our old friend comfortable in his declining years.

During the last few years several of our most esteemed practitioners have found it impossible to provide themselves with the comforts of life, and may the lesson it teaches be impressed upon all here, and let me say to our young practitioners that while under no circumstances should they be mean or stingy, they should by frugal and industrious habits lay by in store for their needs when their hands can no longer provide.

DR. MORGAN: My early impressions of the character of Dr. Dwinelle are very vivid now. When I first learned that there was such a journal as the old *American Journal of Dental Science*,—living away in the backwoods, having a preceptor who did not know there was a journal or a dental college in the world,—when I stumbled upon that fact, a desire to read it immediately arose in my mind and heart, and I wrote and they sent me back numbers; and when I began to turn over its pages I found first the articles of the Gamaliel of our profession in those days, Chapin A. Harris, and along a little further were other articles signed "Cazenovia Editor," and without knowing who "Cazenovia Editor" was, and in my ignorance of the profession and of the qualifications even necessary for its successful pursuit, I began to read those articles, and they made a most profound impression upon my mind, and I learned to admire him for the clearness with which he stated his propositions; and years afterward, as I continued to take the journal, I always looked for his articles among the first. Talking to Dr. Allport to-day, I called to his mind an article that appeared in the early part of 1847 upon the subject of the treatment of the teeth where there was deep-seated decay, the removal of which would probably expose the pulp, and not long since, in looking over an old book in my office, I found a little notice

quoting what he said on that subject, giving the date on which I read it, and the fact that I indorsed the view and proposed to follow it in my practice, with my name to it. I allude to that to show how his writings impressed me at the time. He was one of the best editors that journal ever had. From that time down to the present I have only lived to admire him and to love him. His contributions have always been acceptable, and every now and then a patient of his fell into my hands and I saw something of his handiwork, and I believe I can say truthfully that the most beautiful mouthful of operations that I ever saw made with sponge gold was made by William H. Dwinelle for a Miss Nelson, a niece of the celebrated Lord Nelson of the British navy. They were the most beautiful I have ever seen, considering the large number there were in the mouth.

Misfortune has overtaken him, as it is possible it may overtake any of us. While he has been an active laborer and has made large amounts of money in his life, in his old age he is found to be poor and to be in need, and I cannot imagine how the heart of any man who has any manhood in him does not go out toward him in kindly feeling of sorrow for his condition and with a desire to help him.

SECTION II.

DENTAL EDUCATION, LITERATURE, AND NOMENCLATURE.

REPORT BY LOUIS OTTOFY, CHAIRMAN OF THE SECTION.

MR. PRESIDENT AND GENTLEMEN: The Section on Dental Education, Literature, and Nomenclature begs leave to offer the following as its annual report:

I. Education.

It has been the custom of the Section annually to report the number of dental colleges in active operation in the United States. At the close of the last session the number was thirty-three, there having been no increase from the previous year. There have been established since last year, the Dental Department of the Tennessee Medical College, at Knoxville; the Chicago Tooth-Saving Dental College, at Chicago; the Dental Department of the Homœopathic Hospital College, at Cleveland; the Dental Department of the Western Reserve University, at Cleveland; and the Dental Department of the University of Buffalo, making an increase of five colleges over the previous year; the total number now in operation and granting degrees being thirty-eight. The following is the tabulated number of graduates since 1886:

1886, 503; 1887, 597; 1888, 746; 1889, 796; 1890, 963; 1891, 1241; 1892, 1483; total, 6329, an average for seven years of 904 graduates per annum.

The superfluity of many of these institutions was well illustrated last year, when attention was called to the fact that it required the energy of thirteen colleges, more than one-third the number then in existence, to graduate less than 100 students; eight more turned

out 250; while twelve colleges out of thirty-three graduated more than three-fourths of the entire number of graduates.

The following is the number of graduates this year, as reported by each college:

Philadelphia Dental College	142
Chicago College of Dental Surgery	128
Pennsylvania College of Dental Surgery	103
Baltimore College of Dental Surgery	102
Dental Department, University of Pennsylvania	92
Ohio College of Dental Surgery	89
New York College of Dentistry	86
University of Maryland, Dental Department	73
Vanderbilt University, Dental Department	70
American College of Dental Surgery	66
State University of Iowa, Dental Department	57
Indiana Dental College	56
Southern Dental College	51
Kansas City Dental College	50
Western Dental College	39
Dental College of the University of Michigan	39
Boston Dental College	38
Louisville College of Dentistry	36
Missouri Dental College	33
University of California, Dental Department	24
University Dental College	18
United States Dental College	14
Harvard University, Dental Department	14
University of Tennessee, Dental Department	12
Cincinnati College of Dental Surgery	10
Dental Department of Tennessee Medical College	8
Chicago Tooth-Saving Dental College	7
Dental Department of Homœopathic Hospital College	6
Columbian University, Dental Department	5
National University, Dental Department	4
University of Minnesota, Dental Department	4
Howard University, Dental Department	3
Northwestern College of Dental Surgery	2
Meharry School of Dentistry	1
German-American Dental College	1
Total	1483

Two of the new colleges have held no commencements.

It will be noticed that it required this year the efforts of fourteen full-fledged colleges, with their equipments, faculties, etc., supposed to be perfect, to graduate ninety-one students, an average of six and one-half each. In fact, eleven colleges together graduated but fifty-one students. Who can estimate the loss to the profession were these eleven colleges to be suddenly lopped off the list? As a matter of fact, the greater number of the graduates, namely, 851, were passed from ten institutions, or a little more than one-fourth of the entire number of colleges.

The three years' college course which became operative at the beginning of the last session does not seem to have had the ill effects so strenuously predicted at the time this Association by resolution requested the addition of one year to the curriculum. On the contrary, the class of students entering the colleges, though smaller, is superior to preceding ones, and the students fully appreciate the additional advantages gained. It will be only a short time when the limit of years which a student should devote to dentistry will be placed at four, of nine months each. It is quite probable that any young man, with the proper preliminary education, will find that time sufficient to become thorough.

The list of local dental societies compiled last year by the Section has been further improved and made as nearly perfect as possible. According to this there are now about 130 local societies in the United States,* with an aggregate membership of nearly 5000.

The Chairman of the Executive Committee has issued circulars to all these societies, with a view to increasing the delegate representation in this Association, and also with the object of securing material from all societies for representative national Section reports. Two years ago twenty-two, and last year twenty-four, societies were represented in this Association.

One of the important advances made in dental education during the year is the establishment of reading courses, somewhat after the Chautauqua idea, on the part of the Post-Graduate Dental Association of the United States. The plan comprises several reading courses of from two to five years each. No two reading courses are alike, and any one can profit by reading in several classes at the same time. At present Class A is instituted. This covers a two years' course of reading. The books selected are on crown- and bridge-work and

* See Appendix.

human dental anatomy. The student receives a syllabus and instructions as to how to proceed with each work. In dental anatomy he is obliged to make a certain number of sections of human teeth, study the outlines of enamel, dentine, root-canals, etc. ; while in crown- and bridge-work practical specimens must be made in some of the noble or base metals ; these, with written examinations, are submitted to competent examiners. The Association issues a certificate as evidence of the proficiency attained.

The other courses are to cover a wide range of reading touching on the border-land of allied sciences. The examinations in some of them will equal, if not exceed, anything of the kind in dentistry, and the certificate or degree, or whatever may be granted, will represent exactly what it says. None of these courses is in any sense to take the place of the college course, but merely to supplement it, and to imbue the dentist with the importance of the scientific, artistic, and literary aspects of dentistry.

II. Literature.

Several important additions have been made to the literature of the profession during the past year.

It is worthy of mention that the periodical literature is far superior to that of a few years ago, and the general standard of dental literature, viewed from any aspect, is equal to the literature of the medical profession. The journals vie with each other in presenting as nearly as possible original matter, and there is to-day but very little copying done. Many of the difficult cases of pathology, histology, orthodontia, and prosthesis are freely illustrated, and to even the indifferent reader it must be a source of profit to have these ocular impressions forced upon him.

In the report of the Committee on Dental Science and Literature before the Illinois State Dental Society, the following recommendation was made :

" What is most needed at the present time is a good quarterly journal of about six hundred pages annually, which could be sold at five dollars per annum, filled with nothing but original matter, and edited by a competent literary dentist, and published by a house selling dental goods, or a syndicate of dentists able to pay for contributions at the rate of five dollars per page. In addition to this, some one should start a weekly dental journal of sixteen or twenty-four pages in a central location, so that dentists could be kept *au courant* with dental news as it transpires, and not get matter so old that they will not read it

when it comes once per month. If two journals of this nature could be established, we think they would pay from the start. The weekly could be sold for three dollars per year, and if ten thousand dentists would subscribe there would be such an awakening of literary activity as has not been seen for some time past."

The following are the most important additions made to the permanent literature:

"Harris's Dictionary of Dental Science," revised and enlarged by F. J. S. Gorgas, M.D., D.D.S. Fifth edition. Published by P. Blakiston, Son & Co.

The earlier nomenclature of dentistry was meager, and in order to make a dental dictionary at all it was necessary to include a large number of medical, botanical, anatomical, chemical, and other terms; but since dental science has made such rapid strides, new phrases, words, and expressions have been introduced. The author has omitted many of the useless terms and introduced nearly all generally accepted words. It is to be regretted that dental nomenclature is in so deplorable a condition that it must be a difficult task for the lexicographer to determine the exact meaning of many words and expressions. The book is a good one, and should be in the library of every dentist.

The same firm has also published the third edition of "Dental Surgery," by Henry Sewill, M.R.C.S., L.D.S. Eng.

This work, though brief and concise, yet covers the entire field of dental surgery. The book is one of the most handy reference books on surgical topics of a dental nature, and has the advantage over the text-book in being quickly referred to when necessary in the study of a practical case at hand.

The fourth edition of Gorgas's "Dental Medicine" is also one of the recent productions of the press of Blakiston, Son & Co.

"Charts of Typical Forms of Constitutional Irregularities of the Teeth," by Eugene S. Talbot, M.D., D.D.S., were published this year by The Wilmington Dental Manufacturing Company. Dr. Talbot has for many years made a study of the subject of irregularities, and in this form of systematically arranged charts the ideas of the author are at once comprehended. These are life-sized colored lithographs made from practical cases. The same author has also produced a second edition of his work on "Irregularities of the Teeth," having 234 illustrations, and coming from the press of P. Blakiston, Son & Co., the second edition being much larger and more complete than the first.

There is also a second edition of "Descriptive Anatomy of the Human Teeth," by G. V. Black, M.D., D.D.S., from the press of The Wilmington Dental Manufacturing Company. The fact that the first edition was so soon exhausted is proof sufficient of the value and usefulness of this book.

"Catching's Compendium" is an annual addition to our literature, published by Dr. B. H. Catching, of Atlanta. It contains a selection of the cream from the dental journals of the year just preceding, and proves a convenient volume when it is desirable to find recent articles on one and the same topic grouped together. It also contains lists of dental journals, dental laws, etc.

The most recent addition to our literature comes from the press of The Wilmington Dental Manufacturing Company, and covers a field not hitherto considered sufficiently extensive to demand separate treatment. "Dental Jurisprudence," by William F. Rehfuss, D.D.S., is an octavo volume of 468 pages. Probably few dentists traveling along in the regular path of daily practice have ever stopped to realize how often instances arise, or circumstances are forced upon them, where they have made themselves liable to criminal prosecution, or where a breach has occurred that might under certain circumstances be made extremely annoying, if not financially disastrous. The author has here collected what seems an endless task: the important cases wherein dentistry clashes with law. There is no doubt that any dentist would profit by the mere reading of these cases, and probably thus prevent himself from becoming entangled in similar ones. The elucidation of patent rights, a history of dental legislation, and copies of the dental laws in various States add considerably to the value of the work.

III. Dental Nomenclature.

Under this head the Committee have no report to make.

DISCUSSION.

DR. ALLPORT: I do not wish to say anything against any reputable dental college; but from what we believe, as well as know in Chicago, about this "Tooth-Saving Dental College," it does seem that it ought not to have been dignified by being mentioned in the report of this committee. For one, I dislike to see it given even seeming respectability by being mentioned in our Transactions, and I therefore move that all reference to it be stricken from the report.

DR. PEIRCE: I hope it will not be stricken out. It is very neces-

sary to have this record accurate. It is not a recognition; it is simply a record.

DR. FILLEBROWN: We want here a record of the facts. I understand the Tooth-Saving College is an entity; that it grants degrees. Consequently we want the knowledge of it here, and the fact put on record, no matter if it is a little disagreeable to the friends of higher education.

DR. TRUMAN: I wish to indorse Dr. Allport's idea. It is disgraceful to have a name of that character go out from this Association. In various parts of this country and in the Old World they regard us from the standpoint of names, and to have such a name for a dental school as "Tooth-Saving College" makes us ridiculous, and we do in a measure indorse it by having it here on our records. I hope it will be stricken out.

DR. HORTON: The Chairman of this Section has reported the fact. I do not understand that this society claims to indorse the reputation of any college or any institution. I do not see that we are to render ourselves ridiculous by accepting a report that simply states a fact, without any indorsement of it.

DR. CRAVENS: I believe, out of the large number of colleges, nearly half are located in Chicago, and if there is one tooth-saving institution there I think it ought to be coddled and taken care of. Don't let it get away.

DR. SITHERWOOD: I do not think the mere mention of this school makes any indorsement whatever, nor that we need to have any fear of what they think about us on the other side of the water. Everybody knows all about our schools. Mr. Brice has written quite well about them. They know that we have some poor schools, which will eventually die a natural death.

DR. BARRETT: I am glad we have a subject up that is within our comprehension, and which we can discuss.

DR. OTTOFY: I admit that I am ashamed to have been obliged to report a college with such a name and having such a reputation as that has; but, as has been stated, it is a fact that it grants degrees, and there are sections of this country where its degrees may be recognized. Many schools which are good to-day were, eight or ten years ago, just as bad as that one. The college is in existence, and there was nothing for the Section to do but to report it.

SECTION III.

OPERATIVE DENTISTRY.

REPORT BY A. W. McCANDLESS, SECRETARY OF THE SECTION.

DURING the year closing July 31, 1892, there have appeared in fifteen different dental publications something like sixty articles relating to operative dentistry, with the following for topics:

Porcelain and glass inlays, 1; The immediate and painless extirpation of the pulp, 3; Treatment and destruction of the pulp, 4; Operative dentistry, 4; Capping exposed pulps, 1; Treatment of pulpless teeth, 5; Relative merits of filling-materials, 4; Preparation of cavities, 1; Art *vs.* nature in the form of contours, 1; The genesis of the contour filling; Care of children's teeth, 5; Vitreous fillings; Soft gold foil as a filling-material; Gutta-percha; Failures of dental operations; Surface protection for plastic fillings; Relative values of cohesive and non-cohesive gold, and a combination of the two; Pulp-stones; The use of gutta-percha as a root-canal filling; Immediate root-filling; The cervical border, 2; Relative conductivity of heat by filling-materials; Combination of plastics and foil; Sensitive dentine; Cocaine as an aid in removing pulps; Care of teeth during pregnancy, 2; Value of crystal gold in dentistry; Inoculation from unclean dental instruments, 2; Combination fillings, 6.

The names of the journals publishing these articles are: *Dental Review*, *Dental Cosmos*, *Items of Interest*, *Dental Headlight*, *Dental Record*, *Dental Office and Laboratory*, *Western Dental Journal*, *Archives of Dentistry*, *Southern Dental Journal*, *Dental Advertiser*, *British Journal of Dental Science*, *Journal of the British Dental Association*, *International Dental Journal*, averaging four articles on operative dentistry for each publication for the year.

I have in my possession a memorandum of each article and the

particular journal and date of the publication in which it may be found, so that should any desire to look up any of these papers I shall be glad to impart the necessary information to make the search an easy one.

I was impressed, in compiling this list, by the fact that during the twelve months just passed one article only has been written on capping exposed pulps, while many of my class at college took as texts for their theses ten years ago, "The Conservative Treatment of the Dental Pulp." I have also noted at dental conventions, local, state, and otherwise, that the essayists who dilated on this subject, "Conservative Treatment of the Dental Pulp," have been almost invariably very young men in the profession and in the practice of dentistry, so that my observations differ materially from those of the gentleman who made the report of this Section a year ago. The old wheel-horses in the profession have less and less to say about this subject the longer they are in the practice. Let me quote from the report to which I have just alluded:

"We are pleased to note that the fallacious and too common opinion of only a year ago, that a pulp once fully denuded of its natural covering could not be artificially protected and its function preserved, is giving way to the more rational idea of conservation."

This society was unfortunate last year in not having time to hear papers by Dr. C. N. Johnson on "Art *vs.* Nature," and by Dr. J. Y. Crawford on "Treatment of Children's Teeth," as both articles were very practical and practicable. They appeared later, however, in the dental journals, and probably had a wider circulation than if only published in our proceedings.

The *Dental Cosmos* this year gives us a new name for the grinding-surfaces of the teeth. "Morsal" is the word.

No new work has been published on operative dentistry this year.

Catching's "Compendium" is an annual and welcome visitor, and of service to the busy practitioner.

The Chairman of the Executive Committee of this Association, Dr. Crouse, has made a strong effort to bring the state and local societies into closer relation and affiliation with this Association, and to that end he distributed, broadcast, circulars requesting Secretaries of these societies and others supposed to be interested to send to him reports of the proceedings of their meetings if there was anything of interest or importance to the profession at large.

To these he received twenty-five replies; in some instances a fairly good synopsis of the proceedings was given, but in the majority of

cases the persons addressed failed to grasp the Chairman's idea, and sent simply a list of subjects of papers read, the names of the authors of the papers, and the names of the officers elected, as if that would be of any interest to this body.

Others promised to attend to the request of the circular, and there the matter evidently dropped, so that in reading over the various replies received by Dr. Crouse I found little or nothing of vital interest to you, at least nothing particularly new or startling. However, a start has been made in the right direction, and there is reason to hope that more thought will be given to this idea by these societies in the year to come.

A few papers of some merit have been read on the direct application of local anesthetics to pulps facilitating their painless removal. Further experiments in this line will doubtless result beneficially to the profession and redound to the comfort of the patients.

We now come to speak of new and improved appliances and materials. Dr. W. B. Ames has evolved the oxyphosphate of copper, a new cement. Crystal Mat Gold is a new name for crystal gold. One of the best cervical clamps, if not the best, is Dr. Keefe's. He has lately improved it as follows: additional strength secured by grooving the front piece, and a stronger spring holds the clamp firmly in place until the screw is set; the jaws, which have been improved by diminished size, can be bent at any angle to suit each individual case.

The sand-paper disk-holder that cannot be improved upon has not yet been discovered.

Improvements are noted in finger sponge-holder, Flexo separating files, binding wire, Johnson's cervix clamp, dento-electric cautery, Dr. How's heater for softening gutta-percha, modification of the Kells bracket-arm for engines, Flexo files for saw frame, improved root-drier.

Among the new and useful devices are a cotton pellet roller, new set of root-trimmers, the Bosworth universal mallet, and silver and platinum alloy screw-posts; Dunn's hand matrix for manipulating plastic fillings, especially large contour amalgam fillings, and restoring interdental spaces. Dr. Dunn has an original method for gaining space between teeth by the use of floss silk and cotton.

Two papers only have been provided for this Section: on "Transplantation," by Dr. Morrison, of St. Louis; on "Matrices," by Dr. Cravens, of Indianapolis.

SECTION III.—Continued.

Replanting and Transplanting Teeth.

PAPER BY W. N. MORRISON, OF THE SECTION.

OF the cases reported to this Association in the years 1875-76, there are two replanted ones still in the mouths, in fairly good condition.

One of these, Mrs. B., was constitutionally the most unfavorable subject that could be selected; while the majority of others were favorable subjects, yet the teeth dropped out in a few years with their roots resorbed. In many cases the sockets were not favorable to plant others, or the patients would not submit to the operation again.

The manner in which these operations are regarded by the profession at large makes it exceedingly uncomfortable for an individual who does plant teeth.

Example: Mrs. H. B. had a left superior bicuspid implanted November 11, 1887. Being the daughter of a physician, she naturally talked over the matter from all standpoints, and consulted the profession of this country and Europe, without getting one good word in favor of such operations. On April 21, 1892, it was with difficulty she was persuaded to have another planted in its place. Then for two or three weeks she had all manner of unfavorable symptoms,—erysipelas, blood-poison, fever, loss of appetite, loss of sleep, etc. I was not alarmed at any time, but my patient and her husband and family were. Fortunately, her physician was in my favor, and told me not to pay any attention to her complaints. Now, if that patient had died or become seriously ill from any other cause or complication at that time, I would have been held accountable to the law for performing an operation not indorsed by the profession.

Mr. E., left upper second bicuspid (dry specimen), planted in enlarged and deepened socket, after the extraction of a root. Symptoms unfavorable; the face was much swollen at the time of the operation, considerable pus oozed from the socket. The swelling continued for a week or ten days, and he complained of a peculiar sensation under the eye and toward the ear, and made several visits to have the tooth extracted, as did also the former patient.

Mr. E., superior lateral incisor that had been planted by a neighbor dentist, who had used a very dry specimen, and drilled a large hole to fill the pulp-canal with gutta-percha. Either the drilling or the swelling of the gutta-percha checked the crown, so that the labial half of the crown came off, with a fracture of the root one-eighth or three-sixteenths of an inch under the gum, the remaining stump and the root being firm and healthy. A gold crown was adapted to it, and worn but a few months, when the rest of the crown gave way. The remainder of the root was drilled out, and another dry tooth planted in its place, which has done several years' comfortable and satisfactory work.

Mrs. Mc., had two dry teeth transplanted May 31, 1888. The root of one became resorbed, and another tooth was planted in its place April 8, 1892.

Mr. P. W., aged about thirty years, had never erupted his left superior cuspid. For several years I had been watching for it, and finally it appeared near enough to the surface to be cut down for and extracted from a horizontal position in the roof of the mouth just inside of the bicuspids, with the point near the central. It came out in good condition, a large, well-formed tooth except a crook near the end of the root. A deciduous cuspid was now extracted, a socket prepared, and the permanent cuspid was planted in its proper place January 19, 1892, and at present is satisfactory to all parties concerned.

Mrs. F. E. A., right upper first molar, three distinct roots, planted November 2, 1891; healed by first intention, and never gave a moment's uneasiness.

Miss C., had lower incisor treated for months for catarrh. It was finally pronounced incurable and was extracted, making the first space in the lower arch. As the space interfered very much with enunciation, after three weeks she appealed to me for relief. I planted another in its place, which has only shallow attachment, but is fairly firm.

To attend ordinary dental meetings and hear papers and discussions, one would think every operator had plain sailing preserving the

teeth,—tapping in a little gold, and the tooth was secure for all time. That, gentlemen, is poetic license. From the mouths of the higher order of patients somebody extracts teeth and roots right along and leaves spaces vacant, or, worse still, substitutes ghastly porcelain counterfeits which work worse mischief to adjoining teeth.

The slaughter-houses are not alone responsible for the toothless specimens too frequently seen.

It has been my practice for years to transplant teeth in all sockets having good alveolar process. Where I remove a single root or two, the process is always very tolerant and comes boldly to my aid in all such operations. With me it is an indispensable operation, and since Dr. Younger has given us the dry specimens, it is much more convenient, though the more nearly fresh a specimen is, the better it suits me.

As in the case of a broken bone anywhere else in the economy, security in position and absolute rest are of the first importance, to accomplish which I use a figure-of-8 suspensory copper wire ligature from the crowns of adjoining teeth over (or under, as the case may be) the cutting-edge of the planted tooth, also securing the ligature in position and the interdental spaces with phosphate cement, the fixtures being worn for six or eight weeks.

SECTION III.—Continued.

Matrices.

PAPER BY JUNIUS E. CRAVENS, OF THE SECTION.

IT is a test of an operator's judgment sometimes to determine whether he shall use a matrix or merely a support for his filling-material. There is a wide difference. Webster's Dictionary says that "a matrix is a mold; the cavity in which anything is formed, and which gives it shape." If this definition is correct, not everything which dentists build gold against should be dignified as a matrix. A neighboring tooth often serves the purpose of a support, but who would regard a supporting tooth as a matrix?

A matrix for filling should offer certain advantages, such as thinness for economy of space; close conformity to cavity-margins, however irregular; sufficient malleability to enable the operator to bend and dilate it at any part and to any extent desirable; it should be cheap enough to be thrown away after once used. Some approximal spaces are impassable, of course; but extensive preliminary wedging should never be necessary to adjustment of matrix or support, otherwise the device is too thick and badly designed, and the operator's judgment is at fault.

Some operators—perhaps many—use closely adapted matrices for gold filling in compound approximal cavities in bicuspids and molars, and it is not my purpose to criticise their methods, because of lack of sufficient opportunity for observing results; but criticisms have recently appeared in some of the dental journals, one writer going so far as to declare that perfect gold filling cannot be done in matrices. I think he is mistaken, for every cavity is a matrix so far as it affects the form of its contents; but from the few cases from the hands of others that it has been my privilege to observe, and a fair number of my own, I am satisfied that failures may easily be made, and that an

operator's confidence in matrices sometimes is abused, because failures at obscure margins may not be discoverable until after the completion of the work. The usual fault with matrix-filling consists in imperfect adaptation of filling-material at cervical and lateral margins. For some operators to meet this objection may be easy, but there are those of us for whom it is not.

Gold cannot always be depended upon for correct adaptation at margins, unless in excess, and close matrices do not admit of excess there. Perhaps there are operators who can secure exact marginal fullness with gold, no subsequent dressing or finishing being required, but most of us find it necessary always to dress away some at the margins for security.

By a support, as distinct from a matrix, is meant something that can be placed between two teeth, one or both of which may require filling, and serve to support the filling-material until secure, but without effect upon the contour. A supporter should also economize space between the teeth to the same degree as a matrix. Nothing more than the slightest primary wedging is really necessary for adjustment of a supporting device of proper thinness. A supporter should be of metal, very thin, springy, non-malleable, with no attempt at conformation to cavity-margins. On the contrary, the margins should stand free, particularly in filling with gold, in order that an excess of material may occur there for subsequent dressing down.

Plastics.—In filling with amalgam or cement in compound cavities in bicuspids and molars, matrices are advantageous. In fact, in any cases where contouring with plastics is intended, and reversing the rule for gold, the matrices for plastics ought to be closely adapted at all involved margins, and should mold the contour to any desired degree, because the plastics are accommodating, and with careful manipulation a perfect cast of a matrix and approved marginal adaptation are attainable by all.

Matrices offering the advantages named in this paper may be constructed of German silver, rolled to U. S. standard wire gauge, Nos. 30 to 34, strips of which should be cut and fitted around the cervix of the tooth, and to conform to the curves of the gum in the same manner as in fitting bands for gold crowns, etc., exercising care to avoid occlusion with teeth of the opposite jaw. A band should close with a lap-joint next to the cheek, and should be fastened with soft solder. In position, such matrix may be dilated or bulged at any part, the metal yielding readily to moderately firm pressure so as to conform to an approximating tooth or give fullness at any point.

Amalgam thus supported may be permitted to stand several hours to acquire hardness, and often to accommodate the dentist's time-demands. No wedging, no ribbon-saw is necessary, because the band has guaranteed enough space for finishing purposes, admitting the thinner strips employed for that purpose.

In filling with gold in the same class of cavities, plain shields of the same thin German silver will hold all the space required, and at the same time, if a little more space should be desirable for finishing purposes, it may easily be gained during the operation of filling by driving the gold firmly against the supporting shield, the gold actually wedging the teeth slightly apart.

I have made beautiful and durable contours with os-artificiel by use of the band matrix,—a fact which is merely mentioned here to show the scope of utility of the band device. The German-silver band is easily constructed, easily adapted to margins, and made to mold any vertical contour, and is cheap enough to throw away after being once used. To remove one of these band matrices, the lap-joint should be opened, although it often may be done without.

DISCUSSION.

DR. HEAD : I would like to ask Dr. Morrison if he can give us some idea of how many of his implanted teeth have lasted five years after the operation was completed.

DR. MORRISON : I should judge not twenty per cent. I have a record, but have not looked it over for some time.

DR. SWASEY : In the paper on matrices, the author stated that he did not wish a malleable matrix for approximal cavities. I should not wish a steel matrix, but one that I could hammer to the wall of the approximal tooth. He also spoke of the obscure walls of a cavity. I do not believe there are many men in the room who fill cavities with obscure walls. I should not think of attempting to fill a cavity all portions of which I could not see. He also remarked that it was not necessary to separate teeth where the matrix was used, as the space occupied by the matrix afforded ample room for polishing the approximal surface. Food will collect in any space where you can use a sand-paper disk.

Any man who fills a tooth without seeing the whole of the cavity, who does not separate the teeth by wedging, or who uses a matrix which he cannot shape so that he can see the margins of all the walls of the cavity, is not an operator in the proper sense of that term. I think the matrix a great boon to patients.

DR. MCKELLOPS : I think the matrix a very important instrument, and the profession owe thanks to Dr. Jack for its introduction. In my own practice I first secure plenty of space, so that I can see what I am doing. I bevel the edges of the cavity and then adjust the matrix so that I can see all the edges, and so that I can pack the gold over them perfectly. I then apply jackscrews or Perry's separators to hold the teeth firmly in position. If this is properly done, it prevents pain from either malleting or hand-pressure. In the manipulation of the teeth we should study to see how much relief and comfort we can give our patients in operating. With regard to implanting or transplanting, I would say I have seen a great many of Dr. Younger's operations, some of which have been successful, but the majority have been flat failures. I am not in favor of extracting teeth, but I do extract them where I think it necessary. This matter of separation is a very important one. You must, in treating proximal cavities, get a wide space by wedging, and if you undertake to fill such cavities without having first secured space enough to enable you to see clearly what you are doing from the ground up, you will make a great mistake.

DR. TAFT : This seems to be a simple matter, yet, like a great many other simple things, it is very important. There is quite a diversity of opinion in regard to the use of this appliance, the matrix for filling teeth. Some use it a great deal, others but little ; some do not use it at all. A variety of appliances of this kind have been suggested and brought to the attention of the profession. Dr. Jack, many years ago, brought out his matrix,—a very good instrument, properly constructed, made of steel. The concave side goes next to the cavity, making it similar to a simple crown cavity. Then followed simply thin pieces of steel or other metals, placed in the space between the teeth. Then came the band matrix in a great variety of forms. You all know the various forms that have been introduced or used. Dr. Brophy has a band matrix, and quite a number of others have introduced the same principle in the matrix. The German-silver band matrix referred to in the paper was suggested by Dr. Herbst some years ago when he was in this country : taking a piece of German silver, placing it around the tooth, and with proper forceps drawing the ends firmly together, fitting it closely upon the tooth and soldering the ends with soft solder,—a very simple method of making a very good band for some cases.

Any of these appliances will be good sometimes, but we find a great deal of faulty work resulting, in operations made with the matrix. We oftentimes find that there have been defective borders

of the filling, the matrix coming square up against the edge of the cavity, against the border, rendering it impossible to make a perfect adaptation and finish at that point. While all the forms of the matrix that have been suggested are valuable for certain cases, all these varieties, or well-nigh all of them, should be at hand. One will be better adapted to one case, and another to another.

One point that has not been alluded to is the use of the partial matrix, a very narrow matrix, that when placed in position shall go up one-fourth, one-third, or one-half the distance upon the cavity. This serves to form the lower portion of the cavity, so that the gold may be there introduced, adapted, and consolidated. As it comes up only a little way upon the cavity, the filling is well and perfectly introduced upon the cervical portion of the cavity. Then after the first fourth or third of the filling has been placed in position and well fixed, the matrix may be removed, and the remaining portion of the filling made without the matrix, care being given, as it always should be, in building along the lateral borders or walls of the cavity, to have it perfectly adapted upon these borders and sufficiently flush to make a complete finish of the filling. In that way the difficulty that sometimes occurs in the use of the matrix when it extends to the grinding-surface of the tooth or occupies the whole proximal surface of the filling, is avoided, and a perfect filling, or a good filling, may be made, when if a full matrix were used the border would be more or less defective. In that way the filling upon the cervical border can be commenced and fixed in place most easily and well. There is room for the entrance of the instrument and the disk, or whatever may be used for dressing and finishing, and the remaining portion of the filling made after this. In a great many instances I find this method of procedure better than using the band or the ordinary matrix, and the difficulty that is liable to occur in the defective borders of the filling is in this way avoided.

DR. DARBY: I do not know how much those who follow me may have to say upon the subject of implantation, but it seems to me the subject of the paper is worthy of some consideration at this time. There seems to be a decided difference of opinion in regard to the value of this operation. The inquiry which was put to the author of the paper as to the length of time implanted teeth would remain, and the nature of the reply, were such as to lead many to suppose that they would prove but temporary. I would not be understood as asserting that implanted teeth will remain, even under the most favorable circumstances, forever, but I have seen several which have been in good condition six and seven years, and at the present time give

promise of remaining for as many more; though of course it is impossible to tell how long any implanted tooth will remain, since those which seem to promise most sometimes fail without any previous warning. I may perhaps be justified in consuming sufficient time to narrate a case which came under my observation a year or eighteen months ago. It was that of a lady who went to San Francisco for the purpose of having Dr. Younger implant six teeth in her mouth. Four of these were bicuspids, the others were central incisors. All of them remained six years. One central failed in consequence of absorption of the root. I inserted a small plate with a tooth upon it, and waited four or five months for the socket to fill up, after which I made a new socket and implanted another central, which soon became firm and continues so. I am of the opinion that nearly all implanted teeth will ultimately fail; but if some of them remain six or more years, and others can be implanted in their sockets, the operation of implantation cannot justly be called a failure. My experience has been comparatively limited. I have implanted thirty-six teeth, and so far as I am aware but six of this number have been failures. Some of these have been doing good service for upward of three years. There are instances where the operation is exceedingly desirable. Take, for example, the case of a central or lateral incisor which has been crowned, and the root become split or for some other cause worthless. It may be the only break in the arch. To insert a denture with a single tooth is always undesirable. When it is impossible to match the other teeth with a natural one, a healthy root to which has previously been engrafted a porcelain crown can be implanted. I have done this in several cases with the most gratifying results.

DR. MORGAN: When I came here to-night I determined I would have nothing to say, but there have been some views advanced that I cannot let pass unchallenged. I subscribe to most that has been offered to-night. It has been asserted by two gentlemen that a tooth cannot be filled unless you can look into the cavity and see every portion of it. Some of the best work I have ever done in my life was in cavities where I could only see a small portion, and I have been in the habit of filling such cavities successfully ever since I entered the dental profession, forty odd years ago. Take, for instance, the posterior surface of the second or third inferior molar where we occasionally have to fill them, and I have often filled them when I could only see a portion of the cavity. To be sure I use a glass to see when my cavity is properly shaped, that is, I use it to aid me; but I have always relied as much upon my sense of touch to learn the shape as I did

upon the eye and the glass to assist me. Take it on the left inferior maxillary. I stand on the left side of my patient, and with a right-angle instrument carry around into the cavity, possibly first, for the beginning, a cylinder of what they are pleased to call soft gold, non-cohesive gold, and then with an instrument bent at right angles I fold a strip of gold into it until it is thoroughly compact, and I test the packing by the sense of touch. When it is in there I compress the surface and polish it off, relying upon the glass in that case to secure the finishing which I desire, to a large extent. I have followed that course for nearly fifty years past, and I know that it has been successfully done because of the results. I want to challenge the idea that you must necessarily see into the entire cavity to make a first-class filling. I fill a great many cavities where the eye cannot reach the bottom of the cavity. I do it satisfactorily, and the result is satisfactory. I know that my white-headed friend who is sitting over there has been in the habit of doing that thing for forty years, and if he will get up here and discuss this subject he will tell you the same story. So I want to challenge that idea.

While I am on the floor, I will say that while I have been in the habit of using cohesive gold almost from its first introduction as a material for filling teeth, still I cling to my first love with a good deal of tenacity, and I use quite a large proportion of non-cohesive gold.

DR. MCKELLOPS: I would like to ask the gentleman what gold is? If pure gold is not cohesive, whatever way it is made? If it is pure gold it is cohesive gold. You may call it what you please.

As far as seeing into a cavity is concerned, the gentleman misconstrues. You can use a mirror, and by its aid look into a cavity; but you cannot prepare a cavity as perfectly on the posterior surface of a lower molar nor fill it from behind with the success with which it can be filled by cutting through the crown, so that you can see what you are doing. I challenge him to do it. I am willing to go any distance, and will go anywhere to see him operate. When a tooth so filled is extracted, you will find that the cavity is not properly filled.

DR. MORGAN: If you will come to my office you will see specimens.

DR. MCKELLOPS: I want to see them. There are cases where that thing cannot be done. I have seen such operations; but it takes a pretty good man to make them well, I tell you.

DR. MORGAN: That is what I claim to be, and what I claim to be able to do. I do not claim to make a perfect filling. I claim to make

such as to preserve the teeth. I do not make them perfect. I have yet to see the operations from any gentleman whose fillings are perfect when brought to a proper test and the term is used properly. Fillings that preserve the teeth are in some sense perfect fillings; and if they preserve the teeth, it is all that can be done by any character of filling. Our object is preservation.

DR. MCKELLOPS: Nobody claims anything more than that.

DR. OTTOFY: I was very much delighted in listening to the remarks of Dr. Darby upon implantation. It has been with considerable diffidence that I have said anything on the subject, but I do admit at the present time that I am almost as much of an enthusiast on implantation as I have ever been. I think it was unfortunate that at the time Dr. Younger came East he was obliged to implant teeth indiscriminately, in mouths not properly suited for it. Patients were presented to him who were absolutely unfit for the operation, and unfortunately, under those circumstances, nothing else could happen but what did happen, and that is that most of the teeth which he implanted at that time have failed. There is no question that his private practice shows entirely different results. I agree with what Dr. Darby has said. But I notice this in reference to implantation, that there are few perfect roots with natural crowns to be had, and on many that seem perfect the enamel is checked. I have lost several beautiful cases from the fact that the enamel has broken away beyond the alveolar process, causing irritation and eventually loss of the tooth. At the present time I invariably cut off the natural crown and attach a Logan crown, filling the joint between the Logan crown and the root with gold; simply attaching the Logan crown so as to leave a space between the root and the crown, and then putting in a gold filling, which makes a perfect joint. In that way the tooth is perfectly strong, and can be readily altered and changed in shape. I have some cases that are over five years old, and there is nothing more beautiful in dentistry, in my opinion, than an implanted tooth in a perfect condition. Nearly all of my first cases have failed. Many of the cases were unsuitable, any patient being induced to have a tooth implanted for the sake of having it done; but I can safely say there is hardly any case that I have selected according to my judgment but what is in good condition to-day, and those cases are from two to five years old. Some one has asked how long these teeth will last. Dr. Younger first employed this method seven years ago, so that we can safely say that these teeth will last from four to seven years.

There are cases where implantation, or rather replantation, is advan-

tageous ; cases where a root is absolutely beyond salvation and must be extracted. The socket can be enlarged and a tooth implanted with little difficulty or pain to the patient,—an operation that is simple, and requiring no instruments or appliances except what every dentist has, giving the patient the chance of having a tooth that may be of service for many years.

DR. V. H. JACKSON : I would be glad if Dr. Allport would give his experience with soft gold. It seems to be gradually coming into more general use again.

DR. ALLPORT : Dr. Jackson is very kind in requesting me to speak in regard to the use of non-cohesive gold in filling teeth, and I do not know that I have any objections to complying with his request, although I may not have anything new to say. It would be very difficult, however, for me to speak of the use of non-cohesive gold without also referring to the use of cohesive gold, for I seldom fill a tooth without using both in the same cavity. Both are good, and each is useful and more desirable than the other according to circumstances.

There is probably no better teacher than history. It not only acquaints us with the past, but the light of its facts so illuminates our understanding as to aid us in directing aright our onward footsteps. Up to forty years ago no other gold than non-cohesive was used for filling teeth, and to those not familiar with the facts it may seem strange for me to state that teeth around fillings made by good operators with this kind of gold seldom discolored to any great extent ; and often do we now come across those old fillings, put in thirty, forty, or even fifty years ago, with the tooth around them as clear and perfect as if the fillings were put in but yesterday, while in the same mouth teeth are turning blue and decaying around cohesive-gold fillings, even though put in by those whom we call good operators, that have been in but a few months or years. The trouble with the fillings put in by these old operators was not so much that the teeth decayed around them, as is now so frequently the case with cohesive gold, though the fillings may have been put in by what are reputed to be good operators, as that, being held together simply by mechanical attachment (the interlocking of their different pieces), unless this attachment was particularly strong, piece after piece became detached, one from another, and fell out. In this way one-quarter or more of a filling would be lost, while the balance often remained good and preserved the tooth so far as it extended. While we did not then need any change in the quality of gold we had to enable us to adapt

it perfectly to the walls of cavities, we did need some change or improvement in it that would enable us to so weld the surfaces of our fillings together that they would remain permanent in their entirety.

Some time in the early '50's sponge gold was brought out, and it possessed the much-desired quality of welding under pressure; and had its use been confined to the purpose for which it was intended, the welding and finishing of the surfaces and contouring, when the base of the filling had been made of non-cohesive gold, it would have been a great boon. But instead of this it was used for filling the entire cavity, and although the fillings made of it were hard and beautifully polished, nearly all teeth turned blue and decayed around them, and in a little while its use was almost entirely abandoned.

Then came cohesive gold foil, good for the purpose for which it is adapted, but its cohesive qualities render it so difficult of being perfectly packed to the walls of the cavity that it was for a long time used with about the same results as was sponge gold. That good fillings have and can be made with cohesive gold no one can question, but leakage around them is too frequent to justify its exclusive use.

In the light of history, as well as the fact that non-cohesive gold can be more easily fitted to the walls of a cavity than can cohesive gold, and the further fact that cohesive gold can be welded into a solid and enduring surface, are we not plainly taught that the main body of fillings should be made of non-cohesive gold, and that the use of cohesive gold should be mainly confined to the welding and finishing of surfaces and restoring contours? In this way a better adaptation of our fillings to the walls of the cavity would be secured than is now usually found, and the surface would be more perfect and enduring than can be made with non-cohesive gold.

DR. SWASEY: If I understood the sense of the paper, it stated that in filling teeth with a matrix you did not always see many portions of the cavity. My remarks were to the point that I should never use a matrix that would not enable me to see all portions of the cavity, or which could not be so adjusted that portions of the wall down to a point a little below the cervical margin should be free from the matrix. When I said I must see every part of a cavity, I did not mean necessarily by direct vision, but either directly or by the aid of a mirror.

DR. WATKINS: I have been very much interested in the discussion of the papers. For a long time I have been anxious to hear this subject of implantation discussed. I began to think the subject had almost entirely died away, but to-night we have had a very interesting and very instructive discussion upon it. I have done

some implanting,—not so much as the other gentlemen who have spoken; but I desire to relate one case, and then I wish to ask a question. I had a case which I implanted five years ago. After it had been in the mouth for four years, apparently as solid, if not more so, than any other tooth in the mouth, the outer cusp was split off. I removed the inner cusp and ground the tooth, and put on a crown, about one year since; it is in good condition, and remains crowned. I want to ask a question of the gentlemen who have spoken, Drs. Morrison, Ottofy, and Darby. I wish to ask them how they regard the pericementum: whether it is of any aid or not? Are they particular about retaining it, or do they remove it entirely?

DR. BROPHY: I want to make a few remarks upon the introduction of the use of the matrix. A number of years ago, when I was looking up the history of the matrix, I found in the *American Journal of Dental Science* an article which appeared about thirty-five years ago, from our esteemed friend, Dr. W. H. Dwinelle, of New York, upon the use of the matrix, and I believe it was Dr. Dwinelle that first proposed the use of this device in the filling of approximal cavities, and I desire that our records should show that this matrix was first proposed by him. A matrix is a most excellent device when properly understood and properly used; but when it is not properly used or properly understood, it is an instrument that ought to be let entirely alone by the operator.

SECTION V.

MATERIA MEDICA AND THERAPEUTICS.

REPORT BY GEORGE EDWIN HUNT, SECRETARY OF THE SECTION.

THE past year has been one of activity to the dental therapeutist. Antisepsis and anesthesia are the two subjects receiving especial attention.

Pental.

Pental, an old compound with a new name, has been recently introduced as a general anesthetic, and a considerable degree of success has attended its use. Pental is a colorless, highly inflammable, very volatile liquid, soluble in alcohol, ether, and chloroform, but insoluble in water. Unlike sulphuric ether, it is absolutely non-irritant to the mucous membrane of the mouth and respiratory passages, and its exhibition is unattended by nausea or by a stage of exhilaration and muscular activity. Spasmodic contractions of the muscles of mastication seldom occur, and will readily yield to a further administration of the drug when they do take place.

Anesthesia is produced as rapidly as with nitrous oxide, but the action is more prolonged, and the patient may be kept under the influence for an extent of time sufficient to admit of any of the major surgical operations being performed.

The regaining of consciousness is gradual, and the recovery rapid and complete. Full anesthesia is induced in from three to five minutes, narcosis lasting four or five minutes.

Pental may be administered in the same manner as is ether, but its extreme volatility is better overcome by the use of a modified form of Junker's inhaler, lessening the time of producing narcosis, as well as the amount of the drug used. This latter is an item to be con-

sidered, inasmuch as the present price of the compound ($6 for 2 lbs. 8 oz.) renders it rather an expensive article of the materia medica.

As yet there have been no alarming symptoms reported from the use of pental on man ; but so eminent a therapeutist as H. C. Wood, M.D., has recently declared, after making a few experiments by inhalation and by injection into the veins of dogs, that in his judgment pental is a dangerous anesthetic, more so than chloroform, and that, if extensively used, it will produce death by cardiac arrest. Dr. Wood further states that he believes the after-effects of pental on the human being would be disagreeable, a statement directly opposed to the evidence submitted by Dr. Hollaender, of Berlin, from whose paper on this subject the major portion of this report is derived.

Dr. Wood did not produce death from the use of pental, but in one case, under the lethal dose of two grammes, injected into the jugular vein of a dog, the effect on the heart was very alarming, the action of that organ being completely arrested a half-minute before the cessation of respiration.

In view of these experiments, it would be well to use pental with great caution until the physiological effects of the drug are more definitely determined than they are at present. Further investigation of this subject is now progressing.

Chloride of Ethyl.

Chloride of ethyl has proved itself a local obtundent of considerable worth. For minor surgical operations, such as opening abscesses, lancing boils, extracting teeth, etc., it is admirably adapted, and it also has an appreciable value as an obtundent of sensitive dentine, but in this latter capacity must be used with sufficient caution to protect the pulp from deleterious effects.

Chloride of ethyl is, at present, put up in ten-gramme flasks. Tubes of one-half the size would be amply large for most of the cases in which we wish to employ the drug. Five grammes are sufficient for the extraction of from one to four teeth, or for any other short minor surgical operation. The extreme volatility of the ethyl renders difficult any attempt to save a portion of the liquid for future use after the neck of the flask has been broken, especially in offices where extracting teeth and lancing abscesses are not daily occurrences.

According to recent experiments by Dr. H. C. Wood, chloride of ethyl is a dangerous general anesthetic, and one difficult of administration, owing to its extreme fugaciousness.

Aristol.

Aristol, a combination of iodine and thymol, has now been before the dental profession about eighteen months. To Dr. W. H. Whitslar, of Cleveland, O., is due the credit of first calling our attention to the value of this new antiseptic. Aristol is designed to take the place of iodoform, iodole, and zozo-iodole. It is almost inodorous, and is perfectly non-irritant. It is in the form of a reddish or salmon-colored powder, insoluble in water, slightly soluble in alcohol, and freely soluble in ether and chloroform. The chemical combination is readily broken up, liberating iodine and thymol, and to this feature of its composition is due its antiseptic action.

Aristol may be used in connection with chloro-percha for root-canal fillings; and dissolved in chloroform, in the proportion of sixty grains to the half-ounce, it makes a dressing that may be used in root-canals or as a protective and antiseptic over excoriations of the skin. The powder may be dusted on gangrenous pulps with a fine brush.

An excellent root-canal dressing may be made by rubbing up a grain of aristol in ten or twelve minims of one of the essential oils, to which may be added two or three drops of ether or chloroform, to facilitate the process.

Small rods, composed of cacao-butter and aristol, in the proportion of ten to one, are recommended for use in fistulous tracts.

Aristol should be kept in well-stoppered, dark-colored bottles, and bought in small quantities to insure freshness, as it deteriorates on exposure to light and air.

Argenti Nitras (*Silver Nitrate*).

The use of silver nitrate for the arrest of decay, although not a new feature in dental therapeutics, has recently received additional attention, owing to the experiments made and results achieved by Dr. E. A. Stebbins, of Shelburne Falls, Mass. In the deciduous teeth, or in the adult molars, where imperfection in the formation of enamel has resulted in superficial decay, and especially in those long, narrow, excessively sensitive cervical cavities so frequently met with, it may be advantageously employed.

In cases of approximal decay in the anterior deciduous teeth, the Arthur method of V-shaped separation may be cautiously used to produce a saucer-shaped cavity, and after cutting away to comparatively good tooth-substance a thorough application of the silver nitrate will prevent a recurrence of caries.

A serious and ever-present objection to the use of silver nitrate is the blackness of the cavity after its application, but in the deciduous teeth this unesthetic drawback is more than counterbalanced by its ease of application and the subsequent freedom from decay.

Bichloride of Mercury.

The following is an abstract of a thesis entitled "Corrosive Sublimate as a Germicide," by Chas. T. McClintock, A.M., assistant to the Professor of Hygiene in the University of Michigan. The conclusions arrived at are so totally opposed to all past teachings that it is offered here without comment.

In 1881 Koch recommended corrosive sublimate as the most efficient of all known substances for disinfecting purposes. Since that time it has been universally used. After making some hundreds of experiments, the author finds that Koch and those who have confirmed his work based their conclusions on faulty experiments, the most important of which was the failure to notice that the sublimate formed with the gelatinous coat of bacteria a compound insoluble in water, but soluble in salines and readily removed by the blood. When bacteria treated with sublimate were transferred to gelatine or agar, the capsule of mercury compound prevented the growth of the germ, and the false conclusion was drawn that it was dead. In the author's experiments, this capsule of mercury was removed by precipitation with hydrogen sulphide.

While Koch states that all bacteria are killed in a few minutes by solutions of sublimate 1–1000, the experiments show that bacteria such as *Staphylococcus pyogenes aureus* may grow after having been in the 1–1000 solution ninety-three hours; 1–100, eleven hours; saturated solution, one hour. *Bacillus subtilis* grew after lying in 1–1000 forty-one hours; saturated solution, eighty-five minutes. Typhoid germs, after 1–1000, one hour; germs in fæces, after twenty-four hours in a saturated solution. Several experiments comparing strong vinegar with 1–1000 sublimate indicated that they have about the same germicidal power.

The experiments also indicate that the larger number of bacteria in a given culture are comparatively easily killed, and that the ratio of those killed by a germicide to those that survive is of no value. The conclusions drawn from the experiments are:

1. That the high rank heretofore given corrosive sublimate as a germicide is without warrant, and was based on faulty experiments.

2. Different cultures of the same germ may vary largely their resistance to germicidal agents.

3. Corrosive sublimate forms with cellulose, with silk, with albuminous bodies, and with some parts of bacteria, a compound that cannot be removed without washing. When acting on a germ it forms a capsule around the germ, which protects it from the further action of the germicide, and in turn prevents the growth of the germ unless removed. But this capsule may be removed by the solutions, as in the blood.

The action of sublimate on bacteria is probably closely analogous to that of alcohol, etc.

4. The presence of a gelatinous envelope in many, if not all, bacteria has not received due attention from writers on this subject.

5. In albuminous fluids (and practically all disinfection has to do with such), corrosive sublimate of any strength whatever is not a reliable germicide.

6. While sublimate has no great germicidal powers, it does not follow that it may not be a valuable disinfectant. This point remains to be proved.

It may be well in this connection to call attention to a fact that the author of the foregoing fails to mention. Laplace long since wrote of the coagulating influence of bichloride on albumen, and demonstrated that the use of a solution acidulated with either hydrochloric, tartaric, or even carbolic acid was not followed by that result.

SECTION V.—Continued.

New Remedies.

REPORT BY A. W. HARLAN, CHAIRMAN OF THE SECTION.

Europhen.

ONE of the more recent products of the present activity in the world of research is europhen.

"To produce europhen, isobutylcresol is first obtained by the action of isobutylalcohol upon *o*-cresol in the presence of chloride of zinc at an elevated temperature. This in aqueous solution is acted upon by iodine in iodide of potassium. Instead of using iodine as such, iodine compounds may be employed from which the iodine is liberated by oxidizing agents like chloride of lime. The iodine compound arising from this reaction is isobutyl-orthocresoliodide, or europhen, an amorphous, yellow precipitate, which, separated by filtration and cleansed by washing, is dried at an ordinary temperature, with the exclusion of light.

"By analysis, the percentage of iodine (according to a series of determinations made under similar conditions by the method of Carius) was found to average 27.6, which corresponds pretty accurately to the proportion of one atom of iodine to two molecules of isobutylcresol.

"Europhen is a yellow, amorphous powder, resinous to the touch, which adheres tenaciously to the mucous membrane, to wounds, and to the unbroken skin. It has a specific aromatic odor, which reminds us a little of one of its components, *o*-cresol, perhaps also of saffron. The iodized phénols, too, which are produced from the above-named alcohols, differ little from europhen as to their aroma. The odor becomes apparent only when europhen is used as such,—*i.e.*, as an unmixed powder. It vanishes almost completely in a mixture or solution.

"In reference to solubility europhen has extraordinary advantages. While it is insoluble in water and glycerin, it is *easily soluble* in alcohol, ether, chloroform, and such compounds of these as collodion and traumaticine, or liq. gutta-perchæ.

"As with aristol, the easy solubility of this iodine product in fatty oils is

also worthy of notice. We may by rubbing at a low temperature readily produce a 25 per cent. solution in olive oil. This should be filtered. In alcohol (30 per cent.) it is easily soluble, as also in an equal weight of ether or chloroform. A small precipitate, which forms not only in the oily solution, but also in alcohol, ether, and chloroform, consists of an organic iodine compound, soluble in water and insoluble in the above-named menstrua. A filtered solution in oil remains clear for a long time. It has been proved that neither a 10 per cent. nor a 25 per cent. solution gives a precipitate after being kept for more than three months."—F. GOLDMAN.

"If a filtered solution of europhen in oil is shaken with water, the formation of this iodine compound can be seen for days, as with the undissolved powder. What has been said of the vegetable fat (ol. olivæ) applies equally to ointments prepared with animal or mineral fats (adeps, lanolin, vaselin).

"The supposition appears justifiable that europhen in contact with water (wound secretions) gives off slowly small quantities of iodine, which are immediately combined again, and thereby form the soluble compound. Perhaps the chief part of the action of europhen is to be ascribed to this formation in the nascent state.

"The intermediate occurrence of free iodine can be shown by bringing europhen, which has become free from iodine by long digesting with *starch solution*, after washing and while yet moist, into intimate contact with starch solution (not the starch solution of the German Pharmacopœia, but that resulting from boiling amylum with water), and leaving the mixture upon the filter itself till the moisture has evaporated. By this means the residue becomes blue, as also does the filter. If we wash it anew with water, the filtrate also will be turned blue. That part of the filter which was most exposed to the light shows a correspondingly stronger iodine blue, in consequence of the affinity of iodine for starch, before the formation of the soluble iodine compound.

"There must, therefore, be present in europhen, extremely small amounts of free iodine which form during the drying and cannot be removed from the product. The percentage is so small that the trace of iodine need not be considered. From ten examinations I compute it on the average at 0.03 per cent.

"Europhen is an easily decomposable substance. Therefore, in applying it, certain precautions must be taken. The solution in alcohol slowly gives off small amounts of iodine, which increase with time. In ether the liberation is somewhat greater. If europhen is mixed with fats *combined with starch*, decomposition occurs, which increases hourly, until finally the paste has assumed a blue-black color. This occurs more rapidly if a few drops of water are added. *Therefore all mixtures which contain starch, as, for example, zinc-amylum paste, are to be avoided.* On the other hand, europhen conducts itself quite indifferently to talcum, and the practitioner can avail himself of this substance in cases in which a paste of thick consistence is indicated. Mixtures with metallic oxides (zinc oxide, mercuric oxide) and the salts of mercury are to be avoided. On the other hand, simple mixtures with fats, such as vaselin or lanolin, are very durable. Mixtures with lanolin are especially to be recommended, as this substance takes up a large amount of water and favors a continuous formation of the soluble iodine compound.

"The solution in alcohol-ether is most used for the preparation of europhen bandages. In its preparation, rapid manipulation is a necessity on account of the already mentioned easy liberation of iodine, the amount of which increases with the time employed. For the preparation of vaginal and other suppositories, it is advantageous to dissolve the europhen in some almond oil, and then rub with oil of cocoa. The solution in alcohol or ether, with a partial or complete evaporation of the menstruum, is, on the contrary, unreliable.

"All solutions should be prepared at a low temperature. Warming causes a transposition and decomposition of the preparation.

"*Europhen must be protected from the light and kept in a dry place.*

"Finally, we will add another observation, which concerns the volume of europhen as compared to other substitutes for iodoform. If we regard the specific gravity of europhen as 5, that of sozoiodol is 7.5, of iodol 10, of iodoform 26,—*i.e., europhen is five times lighter than iodoform, and five times as large a wound surface can be covered with it as with the same weight of iodoform*, a fact of no small importance. Then the fine iodoform powder cakes very easily, a disadvantage which does not occur with europhen.

"If europhen is to be a substitute for iodoform, it must possess, in the first degree, the proper anti-bacterial properties. The very thorough investigation by Siebel in reference to this has proved that it is able to exert the same influence as iodoform upon bacteria, in cultures on artificial media. Neither europhen nor iodoform destroys the micro-organisms, but simply makes the medium unsuitable for the growth of the bacteria, and thereby *hinders the formation of the products of decomposition.* It was also established with certainty by further trials that its influence upon the growth of bacteria does not depend upon a mechanical but upon a chemical action.

"The conduct of europhen toward bacteria outside of the organism harmonizes with the results achieved in therapy, and these correspond completely to the claims as to its effects which have been hitherto made for iodoform.

"Furthermore, EUROPHEN NOT INFREQUENTLY PROVES EFFICACIOUS IN CASES WHERE IODOFORM HAS BEEN REFRACTORY. Europhen has also the advantage over iodoform of a relative freedom from odor and the absence of toxic effects. Its low specific gravity is also worthy of mention. This renders it possible to insufflate as large a wound surface with one part of europhen as with five parts of iodoform, and with equal effect."—F. GOLDMAN.

"Europhen is one of the lightest of the substances forming its group, having two-thirds of the specific gravity of sozoiodol, half that of iodol, and less than a fifth of that of iodoform, so that a given surface would require five times as much iodoform as europhen to cover it. The latter has also the additional advantage of not caking so easily as the former. Ointments and solutions of europhen must be prepared cold, and solutions require filtration, as an insoluble iodine compound tends to form, which sometimes causes them to assume a gelatinous consistence. Europhen is not poisonous. Half a drachm or more can be given to a dog with impunity. In the human subject fifteen grains produce no disagreeable symptoms, except perhaps a slight feeling of weight in the stomach. Dr. Eichhoff has prescribed it with great

advantage in several venereal and syphilitic cases, obtaining very satisfactory results in both soft and hard chancres, in mucous patches, and in tertiary ulceration, by means of one or two per cent. ointment. Excellent results were obtained by the application of europhen to simple ulcers, either in the form of powder or in that of ointment. In general, it was found that europhen acts only when brought in contact with secreting surfaces, whereby it is decomposed and iodine liberated. As exposure to light decomposes europhen as it does aristol, it is important that these substances should be kept in dark glass bottles. Bacteriological experiments have been carried out by Dr. Siebel, who finds that europhen has destructive power for micro-organisms quite equal to that of iodoform."—*Lancet*, Aug. 29, 1891.

Europhen, when applied in powder to gingival inflammations produced by the setting of crowns and bridges, promptly and efficiently reduces the swelling and soreness in two days. When it is applied to mucous patches of the cheek or tongue of syphilitic origin, it is equally efficacious, as I have had abundant opportunity to demonstrate in my own practice. Applied to a suppurating or an inflamed pulp, it promptly subdues the pain incident to such conditions. I apply it in powder or rubbed up with lanolin. In the preparation I use twenty-five parts of europhen to seventy-five parts of lanolin. This is also a very neat way to use europhen in excoriations around the corners of the mouth or the nose. As an agent for inflamed sore mouth under metallic or rubber plates, the lanolin paste is exceedingly desirable. It may be used as an after-dressing in pyorrhea pockets as long as it is desired to secure the benefits from the liberation of iodine. Your attention is earnestly recommended to europhen as a parasiticide where such agents may be required. It is barely possible that it would be extremely useful as a dry dressing in empyema of the antrum, but I have not as yet used it for that purpose.

Acidum Chloraceticum (*Trichloracetic Acid*, $C_2HCl_3O_2$).

Trichloracetic acid, discovered in 1838 by Dumas, is made by treating chloral hydrate with three times its volume of nitric acid, and placing the whole mixture in the sunlight until the red fumes disappear. The liquid is then distilled, and the portion coming over at 195° C. is pure trichloracetic acid. The trichloracetic acid is easily soluble in water or alcohol. It is a powerful caustic, quickly destroying the epidermis or mucous membrane.

It is found to be in colorless, rhombic, deliquescent crystals, freely soluble in water or alcohol. It is a product of the oxidation of hydrate of chloral by means of nitric acid. It is an escharotic. When diluted with water to three per cent., it is an excellent local

astringent and stimulant. When it is used to soften or decalcify the serumal plates attached to the roots of teeth, a ten per cent. solution in water should be used. The action of the acid may be modified with carbonates of soda or magnesia, or any suitable alkaline solution. The trichloracetic acid seems to have that peculiar property of softening calcific and sanguinary deposits on the teeth without injury to the substance of the tooth. Trichloracetic acid is submitted as an agent of undoubted value in dental therapeutics for the following purposes: First, its solvent effect on calculi on the roots of teeth; second, its destructive effect on the pus-producing surface of the sockets of teeth; third, it is a good astringent; fourth, it is a stimulant; fifth, it is an energetic caustic for the destruction of morbid growths, epulis, excrescences on the pulps of teeth, and overhanging gums on third molar teeth; sixth, as a refrigerant mouth-wash in one-half to one per cent. solution in water.

Syrup of Iron Chloride.

In all cases where an efficient tonic preparation of iron is to be taken by a patient, the elegant formula of Dr. G. W. Weld is to be preferred to the pharmacopœial preparation so long in use, as it is not injurious to the teeth. Many members of the medical profession are prescribing Dr. Weld's formula, and it becomes our duty to insist, when iron is to be used internally, on the patient taking the non-alcoholic syrup of iron chloride.

The dose is one tablespoonful, diluted with three times its volume in cold water. It acts as a diuretic, and in anemia, erysipelas, diphtheria, and neuralgia, in many cases, it has no equal as a prompt remedial agent.

DISCUSSION.

DR. ABBOTT: I am both astonished and pleased. I am astonished that such men as Koch, for instance, should have made a mistake. I am astonished that so many men after Koch's experiment with bichloride of mercury should have kept on making mistakes for so many years. It seems that every year we get a prop knocked out so far as antiseptics are concerned, and we go down. We shall soon find that we have nothing at all that will destroy germ-life; that it is all talk; and that germs of all kinds are as thick as they ever were, even in the midst of the so-called antiseptics. There seems no possibility of stopping them. If there is anything known to medical science, as we have understood it, that will destroy anything in the way of organic life, it is bichloride of mercury. If it will destroy

human life and destroy all kinds of animal life, we naturally suppose it will destroy organisms which are said to prey upon human life. Whether this be true we are in doubt, from the report of this committee. It is a question in my mind whether we have anything that will destroy all kinds of organisms about the mouth, or that they should be destroyed. I hardly think anything has yet been discovered that would do it. Still, we have in our practice obtained what seemed very good and satisfactory results from the use of bichloride of mercury, doing away almost entirely with the possibility of the general disturbance brought about, or supposed to be brought about, by organisms. We rely upon it to a very great extent, as all surgeons have done, and do to-day, in all their operations. If that be the case, there must have been a mistake by these last experimenters, or the destruction of the organisms does not remove the poison. I am now, as I have always been, strongly of the opinion that micro-organisms play a much less important part in the production of disease than is generally supposed. I believe that chemistry is the science we have yet to rely upon for the discovery of the causes of the different diseases to which flesh is heir.

There is one material that I use freely that was not incorporated in this report. In the treatment of diseases about the mouth, and particularly in the treatment of alveolar abscess, there is nothing in the pharmacopœia that with me will take the place of chloride of zinc. It is a powerful escharotic, a strong stimulant, and a good astringent. These three qualities make it particularly useful in this common but generally easily managed disease.

The remedy that Dr. Harlan has referred to particularly as an antiseptic and agent for treating stomatitis I know nothing about, but from his statement I fancy it is a very excellent one. If it will relieve those excoriations and disturbed points under plates, it is certainly a remedy which every one should have in his office if he has anything to do with mechanical dentistry. If it will relieve the pain around the roots of teeth where crowns have been set and where tartar has been removed, it is certainly a remedy worth making the acquaintance of at once.

In reference to the preparation of iron that the doctor spoke of, prepared by Dr. Weld, of New York, there is something a little peculiar. It is claimed that it is not an acid ; that it will not affect the teeth. There is another thing about it. If you let it stand in your office for a week or two, the iron is precipitated. Whether that has been overcome or not I do not know. I think, however, that that

difficulty has been overcome. If that be the case, Dr. Weld's preparation is a most valuable one, because if there is any one thing that has done injury to people's teeth, methodically and rapidly, it has been the tincture of the chloride of iron as it is ordinarily administered. In all malarial districts it is given in large quantities. Its restorative properties are wonderful, and if they have retained the restorative properties in this preparation that are in the original tincture, and have gotten rid of its bad effects upon the teeth, it is a great thing to have accomplished, so far as the welfare of the people is concerned, and I congratulate Dr. Weld, and wish it and him a great deal of success.

DR. MARSHALL : I wish to refer to one remark that Dr. Abbott made in regard to the use of antiseptics. He made the statement that almost all surgeons had relied upon the bichloride of mercury solution in their operations. That was a pretty broad statement. There are a great many surgeons who do not use it at all, but rely simply upon sterilized water, especially those who are making abdominal sections. We have one surgeon in Chicago who has become very noted in this line, who has not for the last few years used bichloride of mercury at all. He simply uses sterilized water. His instruments are boiled before being used, his own hands having been thoroughly cleansed with soap and water, using sterilized water. The parts are washed with soap and water before the operation is made, and then washed again with the sterilized water. The sponges have all been boiled, and they are wrung out of sterilized water. The irrigator is charged with sterilized water, and the abdomen is washed out with that as much as possible after the operation has been completed, in removing the tumor, or whatever it may be, and again washed with sterilized water. I have seen a great many of those operations, being connected with the same hospital, and he has had better results by the sterilized-water method than any of our men have had with the bichloride solution.

One word in regard to that part of the report which deals with antiseptics, especially that in regard to pental. I say here, I have never used pental ; but just before leaving home I came across a report from Professor Gurlt, the Chairman of the Committee on Antiseptics of the German Surgical Congress, in which he gives a report of 109,230 cases of narcosis, in which 39 proved fatal. Of these chloroform was used 94,123 times, with 36 deaths,—one in 2614 ; out of 8432 cases with ether there was one death. You see that is a better percentage ; we used to put it about one in 5000. There were 2891

cases of anesthesia with chloroform and ether combined, with one death. There were 1380 cases of ether and alcohol combined, with one death. There were 2179 cases in which bromo-ethyl was used, with no death ; and 217 cases in which pental was used, with one death, *proving from this report* that pental is the most dangerous of all the anesthetics. One swallow, however, does not make a summer ; but these facts teach that we should use pental with caution.

DR. PEABODY : There is to me no other subject in our profession of as much interest as that of this Section. By medical men we are considered largely as mechanics merely, because our knowledge regarding therapeutic agents has been limited. We have too many agents in our general practice, and we have too few. New discoveries are being made yearly, and old and tried ones laid aside. New ones in the hands of certain practitioners seem to produce results which cause the larger portion of the profession to adopt them, expecting similar results from their use ; but in probably fifty per cent. of the cases where these new remedial agents have been tried, failures of the most disheartening character have followed.

We of course want new agents that will give us better results than those we have at present, and we are constantly in search of them, and gentlemen who have chemical lore and are capable of making these investigations are the lights to whom we look. But occasionally men not so profound, by accident stumble upon something of great value. I hardly understand why old tried-and-true remedial agents are cast aside. We have had good results from such remedies as carbolic acid and creasote, the first things we used, and yet to-day there are many members of the profession who ignore them altogether. Iodoform has been extensively used by the dental profession for some time, and the results have been varied. Some practitioners depend upon it entirely, while others have no use for it.

I have brought to the Association, simply for exhibition, a very simple instrument, consisting of a metallic tube passing through a cylinder, the tube being closed in the center, and perforated on each side of the closure for the passage of gases. At one end of the tube is a rubber bulb, at the other a syringe point. This instrument up to the present time has been used only with iodoform.

The cylinder is heated over the blaze of an alcohol lamp, until by pressure on the rubber bulb vapor passes from the syringe point. The bulb is then placed in the hand of the patient or an assistant, and the syringe point into the pulp-cavity or root of the tooth ; the bulb is compressed, and the vapor forced into the canal. The vapor of the

fused iodoform is passed under pressure into the tissue, whether it be in the canal of a tooth or other locality.

The results of the use of this agent in this manner have been wonderful. By the heating of the cylinder the iodoform is fused and iodine is eliminated ; that passes into the tissues, and certainly does produce disinfecting results. Now, iodoform is by surgeons and physicians considered to be not a disinfectant. Some claim it is not an antiseptic. Whether it is or not, in the form of vapor it does control septic conditions. The vapor of iodoform passed through this instrument into the canal of a tooth which may be filled with pus will traverse the whole tract of the canal, even into the tubuli, disinfect the tooth, and abate the inflammatory conditions. I am speaking now of the action of iodoform, because that is the only agent that has thus far been used with this instrument. Of course any better drug can be used. This process has been in use now for about three years, and the gentleman who introduced it states that but one or two cases returned to him after treatment.

Iodoform is objectionable on two accounts. First, on account of its odor ; but that is not so disagreeable in the vapor as otherwise. But the greatest objection to me is the rapid iodization of instruments which the vapor occasions. It has occurred to me that aristol or europhen might be substituted for iodoform. Dr. Hunt stated, I believe, that aristol was a non-irritant. The slight experimentation it has undergone has led operators to believe that it was to some extent an irritant.

I consider the application of vapor under pressure an idea which is calculated to revolutionize the practice of therapeutics, not only in oral but in general surgery. In hidden tracts, canals, and fistulas, where it is almost impossible to introduce liquid applications, this vapor under pressure must necessarily be compelled to come in contact with the entire surface of the diseased tract.

DR. GEO. E. HUNT : Dr. Abbott very truly stated that bichloride of mercury was sure death to animal life, but even if that be so it has not been sufficiently proven that it is always certain death to vegetable parasites.

The portion of the report referring to bichloride of mercury was as new to me two weeks ago as it was to you who heard it this morning ; but I have been assured that the experiments were faithfully conducted under the supervision of very careful and competent men, and I think it probable there may be more in this than we are at present disposed to believe. We all know that with the best antiseptic pre-

cautions and the use of bichloride of mercury septic poisoning occurs sometimes after surgical operations. When that does take place, we are prone to attribute it to the fact that something used about the operation was not thoroughly disinfected. That is only a supposition; and might we not as reasonably suppose, where this occurs after the use of the bichloride, that the germs have been encapsulated with the albuminous coating which has been washed off in the blood, and sepsis has consequently followed? It seems to me that this part of the subject requires further investigation before we can dispose of it finally.

The use of the non-alcoholic syrup of chloride of iron is very much to be commended, and in this connection I would like to state that the use of the carbonate-of-iron pills known as Blaud's pills is preferable to that of any other form of iron when the patient's stomach is able to digest them.

I have in mind a case of anemia following gastralgia. The lady had suffered at intervals for ten years, the attacks being not at all regular but very severe. I put her on a course of alcoholic tincture of chloride of iron for one month, and followed that with one-thirty-second grain of strychnia three times a day, and Blaud's pills (five grains) three times a day, for three months, when she was dismissed. Six months have elapsed with no return of her trouble.

Regarding Dr. Peabody's remarks concerning iodoform vapor, I do not think there is anything particularly new in them. The method of using iodoform vapor in root-canals was fully discussed by Dr. W. H. Whitslar, then of Youngstown, now of Cleveland, O., five years ago in the *Dental Review*, and it has been proven that while iodoform vapor is heavily charged with iodine, and is antiseptic so long as the iodine is not evaporated, yet the iodine does evaporate very quickly, leaving behind only a carbonaceous residue. This residue is aseptic, but not antiseptic, and therapeutically is inert; but it is better than septic matter in the root-canals.

DR. ABBOTT. There is one point in reference to the use of antiseptics which it would be well for us to bear in mind, and particularly this preparation of bichloride of mercury. You remember that some years ago—quite a number of years ago—we had an impression that carbolic acid was one of the best antiseptics that ever was known. In fact, I think the authority for this idea came from Germany, where a great deal of study of this sort is carried on. One gentleman states that carbolic acid is the best of antiseptics. Another experiments with it, and he finds after a while that he has seen germs of different kinds, and parasites working their way around through the crystals of car-

bolic acid; that they were not at all destroyed by it; that they lived upon it, or lived with it as well as they could anywhere else. But subsequent investigations showed that carbolic acid, when properly diluted, would readily destroy germ-life. Bichloride of mercury may be used in the same way. The experiments given in the paper were from strong preparations, of which a saturated solution was one, in which germs lived a great length of time. Another was a strong solution of twenty per cent., another of fifty, or something of that kind. May it not be a fact that these solutions are all so strong that the organisms refuse to imbibe them? Do they not wait until something else comes along that is more agreeable to their taste? For instance, you take a preparation of 1 in 10,000 (that is a preparation I use for washing out all canals of teeth and alveolar abscesses). This, I conclude, the organisms imbibe freely, consequently they are destroyed. One in 100,000 is now claimed to be a germicide.

DR. LOW: I remember a very interesting series of experiments by Dr. Miller, of Berlin, with bichloride of mercury, carbolic acid, iodoform, and many other medicaments; and if his conclusions are correct, bichloride of mercury seems to be the only one—and that was in proportion, I believe, of 1 to 480—that would destroy germ-life in cultures. Dr. Barrett can tell about that.

DR. BARRETT: I do not remember just what it was.

DR. LOW: I am quite sure he claimed that bichloride of mercury, in order to destroy germ-life in cultures, should be in the proportion of 1 to 480.

A word in regard to root-treatment. If others have had the same experience I have had with iodoform, they will not use it, because it is so very disagreeable in the office, and also because the patient will, under the most careful manipulation, complain for a number of months that he can constantly taste iodoform, especially upon waking in the morning.

DR. FILLEBROWN: I desire to call attention to one important fact, and that is that it is not bacteria themselves that make trouble in the human system. Put bacteria of any kind into living tissue, and they will perish as quickly as they will in any of the antiseptics or germicides that have been mentioned here. It is only dead tissue that offers food for the support of bacteria. When we get blood-poisoning bacteria do not cause it, but their products, the poisonous ptomaines. I am not saying anything new; I am only calling attention to facts well known and well established. If you will perform any surgical operation and leave no *débris* there, no tissue out of the circulation,

and will bring the surfaces close together, I will take all the chances for the flourishing of any kind of bacteria, whether you have used antiseptics or not. It makes no difference whether you use the sterilized water or Niagara water, so that it contains no dead matter. I think the necessity for the use of antiseptics and germicides is very much over-estimated. We had it illustrated in the allusion of Dr. Abbott to the fact that the experiments with the bichloride of mercury produced such different results in the hands of different men. It shows that there is something that is not understood, something not apprehended. We know perfectly well that during the last fifteen years the disuse rather of germicides has been growing, and many of the most eminent surgeons in the world to-day perform their operations without the strict antiseptic precautions that were first advocated. It has been proved by long series of experiments in different men's hands that a solution strong enough to destroy germicides, strong enough to destroy bacteria, will be strong enough to exceedingly injure, and perhaps jeopardize, delicate tissues on which we operate, and I want this borne in mind, that thoroughness and cleanliness are more important than any antiseptic solution that was ever used.

DR. PEIRCE: I have kept my seat, hoping that some one would express my views better. The paper read by Dr. Harlan made allusion to trichloracetic acid. My friend Dr. Kirk asked me, about a year since, if I had tried this article. It is so eminently adapted to our needs that I cannot let the paper pass without saying one word in regard to it. Where you have a spongy condition of the gums, such as in pyorrhea, impacted molars, cavities of decay, etc., which it is desirable to remove, it is from its prompt escharotic properties the most appropriate application one can make, and so easily and simply applied by taking a wooden spatula and wrapping on it a few fibers of cotton, then saturating with the acid and rubbing it over the tissue. It is, as remarked by the essayist, such a powerful escharotic that one or two applications will remove the abnormal growth. Again, where you have, after scaling the teeth, little nodules of deposit on the roots, by the same little wooden spatula, saturated with this acid, you remove the accumulations, by passing it down into the pocket toward the apex of the root. Then, again, it has a very happy result on the soft tissues themselves, being a powerful escharotic and astringent. You will find that an application into the pocket, after you have smoothed the tooth, using it carefully, but sufficient to produce an impression on the soft tissues, will arrest the decomposition that is so common. One or two applications will invariably make improvement in the condition. I have had

very desirable results from its careful use in all the cases of pyorrhea of this nature which I have treated. I have used it also for treatment where there have been putrescent pulps; a small quantity in the root arrests decomposition.

DR. PATTERSON: The report of the Section and the papers have been very interesting to me, especially the reference to nitrate of silver. We all have a great number of young patients between two and five years of age with their deciduous teeth having incipient decay, and with some of them, on account of some peculiarity or bad training, it is almost impossible to introduce any sort of filling-material. It has been suggested,—I don't remember by whom,—during the last few months, that incipient decay can be arrested by the application of nitrate of silver. With that I have been experimenting, and I do not know what the result will be, because the experiments are only a few months old. If we can arrive at a solution of that difficulty in these cases I have referred to, it certainly will be a great thing. I have been told, since this paper has been read, that this is not a new treatment, that in olden times of the profession this practice has been followed; and if any one has had experience in that direction, I should be much pleased to know what the result has been.

DR. TAFT: In regard to the use of nitrate of silver in the treatment of the decay of the teeth, I would say that I first heard of it more than forty years ago. The late Professor James Taylor, in his instruction in the Ohio College of Dental Surgery, recommended that treatment for decay of the teeth. He recognized the fact that the darker varieties of decay were the slower, and the suggestion was then made that by the use of nitrate of silver the nature of the decay was changed from the light and rapid to the dark and slow. Dr. Taylor used nitrate of silver quite extensively in his treatment of both the deciduous and the permanent teeth; and from that time to the present day I have been in the habit of using this material in certain cases, and especially in deciduous teeth, and was warranted in continuing the use of it from the good results derived. A year ago, at Saratoga, this subject was presented by Dr. Stebbins, who was accompanied by a boy with teeth treated in this way, in which the decay seemed to be arrested. Under favorable circumstances I know that decay will be arrested by this treatment, or at least much retarded. I presume, however, that in the application of this preparation for this purpose, if the mouth is wholly neglected it might fail to accomplish the desired results; but, after all, decay is retarded by this application, and in some instances I know it has seemed to be arrested altogether, and especially in deciduous

teeth. I have not experimented as much with it in permanent teeth as temporary ones, but where I have used it it has usually been attended with good results. As to how the result is produced there may be a variety of opinions. My impression is that it is by its antiseptic power, by the destruction of the influences that are operative in the process of decay.

DR. TRUMAN: Ever since I have been in the profession and attended dental meetings, whenever any new subject comes up there is sure to be some one who claims that he knew and practiced it years ago. In the present instance he had used nitrate of silver for the purpose named forty years ago. Why was it not given to the profession? I have no confidence in that sort of dentistry. I have been in the practice of dentistry over forty years, and I think I am tolerably familiar with its literature on different subjects, from the early times to the present, and I have yet to remember a single paper on nitrate of silver for the prevention of further decay in teeth. If Dr. Taylor or Dr. Taft has been in the habit of using this agent as recommended by Dr. Stebbins at Saratoga last year, they are censurable in that they failed to bring it before the public. Dr. Stebbins I hold to be the originator of this treatment of deciduous teeth, and, to my view, it is one of the most important processes introduced to the dental profession in my memory. I am not willing to sit here and have the credit taken from Dr. Stebbins.

I have nothing to say upon the general topics that have been before you this morning, because I know almost nothing about them. I have worked with germicides perhaps as much as the majority, and have had most excellent results, but I fear there is not in use to-day a germicide proper. The agents employed, in my judgment, simply inhibit for a time development of micro-organisms. To destroy absolutely means, if I understand it, destruction of the tissue; hence it is questionable whether a true germicide can ever be used.

DR. TAFT: I do not claim originality for this. I simply stated where I saw it first used, and I then said that I had used it myself for years, or since that time, and I have not kept it a sealed matter all these years. I have occasionally in associations spoken of it. I am not certain whether I have ever spoken of it in this Association or not, but I have many times, before societies, referred to this matter, and to the source of my information in regard to it, and referred to the results of my own use. So I think the statement Dr. Truman made needs a little modification. I know also that matters are oftentimes presented anew,—things which have been presented long ago

and have been forgotten, and are revived, and perhaps not always, but sometimes, brought forth as a new thing. That is true in regard to many things.

DR. JAMES MCMANUS : The use of nitrate of silver has been common for many years. I know the gentleman I studied with, from the time I was twelve years of age, frequently used nitrate of silver about the necks of teeth where they were very sensitive. I know also that about five years ago a lady came into my office whose teeth were all black around the cervical line, and a dentist in Indianapolis had been treating them with nitrate of silver. They had been so sensitive that she could hardly brush them, while after that treatment with nitrate of silver they were very comfortable, and the only bad feature was the discoloration. I know Dr. Stebbins well. He has been a friend of mine for years. I cannot tell just the time he commenced the use of nitrate of silver, but I have seen those cases which he exhibited. I saw them a year or two before they were presented at the Saratoga meeting, and I have seen them since, and I know they have been very successful. The treatment has seemed to entirely arrest the decay, and the use of nitrate of silver as exemplified in those cases has been very profitable.

DR. HARROUN : I rise to defend my good friend, Dr. Taft. I do not want these old men to quarrel. I have known Dr. Taft intimately since 1858. I knew Dr. James Taylor a short time afterward, and both of those gentlemen in my hearing have reported the use of nitrate of silver, and I have used it myself upon their recommendation.

DR. TRUMAN : I did not wish to be understood as implicating Dr. Taft, or saying that he did not tell the truth. I simply asked why he did not publish the results he claimed to have accomplished to the world at the time of the discovery. Nitrate of silver has been used in dentistry for over fifty years. I am perfectly familiar with that fact, but its use in preventing caries I had not heard of until it was introduced by Dr. Stebbins at Saratoga last year.

DR. MOORE : I want to call the attention of Dr. Truman, in regard to this remedy, nitrate of silver, to the fact that in an institution in which he was a professor more than twenty-five years ago we were taught to use that remedy,—not for the purpose of treating pyorrhea alveolaris, but for the arrest of decay and for sensitive dentine. Dr. Darby, Dr. Peirce, and a number of my classmates here will remember that that was taught at college,—taught and forgotten.

DR. PEIRCE : I do not remember the time when I did not keep a stick of nitrate of silver in the office for the purpose of obtunding

sensitive dentine, but that is very different from the systematic experiments made by Dr. Stebbins. I have taught ever since 1857 that it is one of the best materials for the purpose of relieving the sensitive surface of the tooth, where it was necessary to cut it down with a file or a chisel. Of its virtues I have taught every class every year since 1857. I remember Dr. Buckingham on one occasion said we made a great mistake in using that form (stick caustic). It was, he used to say, as well or better to have a piece of silver wire and a little nitric acid, and obtain the same results. He told that here, at a meeting twenty years ago. But this was not for the purpose of arresting decay. I coincide with Dr. Truman when he says that Dr. Stebbins is the first man who has ever published the results of a systematic series of experiments for the purpose of arresting the decay of the teeth.

DR. PEABODY : Over twenty years ago I used nitrate of silver on many occasions for the purpose of relieving the sensitiveness of teeth at the necks, and I have known of it for that purpose, but it is only within the last twelve months that I ever heard of it as having value for the purpose of arresting decay. Dr. Taft made the statement that he had heard of it from Dr. Taylor, for the purpose of changing the lighter color of decay into the darker, from the fact that the latter seemed to progress more slowly. That I never heard of, and the general use, as Professor Peirce has said, has been for the purpose of relieving sensitiveness, and until Dr. Stebbins introduced it it had not been used for the purpose of arresting decay, to my knowledge.

DR. CRAWFORD : There is no question in my mind but that nitrate of silver has been recognized as an agent in the treatment of diseases of the oral cavity ever since the organization of the dental profession, and both sides are right upon this question, and yet both are wrong to a certain extent. The only point at issue is as to who is entitled to the credit for the application of nitrate of silver for the treatment of children's teeth, under the idea that the diseases of children's teeth can be treated more readily and thoroughly from a therapeutic standpoint.

Dr. Stebbins is entitled to that honor, so far as my reading goes. That Dr. Taft, and all men who have written comprehensive works on the subjects of dentistry, refer to nitrate of silver in connection with the treatment of dental caries, is not questioned ; but none have made the claim that it was capable of arresting carious action. They used it as an obtundent. They did not use it with the idea that nitrate of silver had any great effect in bringing about relief so far as cure was concerned, but they applied it to give comfort to the sensitive surface.

DR. HARLAN : The points brought out in the discussion are rather satisfactory to the committee making the report, but to clear up the cloudiness surrounding the subject of the use of bichloride-of-mercury solutions, I would state that the experiments of Laplace, of Philadelphia, showing that five parts of tartaric or hydrochloric acid, or even carbolic acid, added to the 1-in-1000 solution of bichloride, would make it absolutely reliable as a destroyer of micro-organisms. There have been no experiments anywhere to disprove that. That conclusion had been arrived at by Dr. G. V. Black, of Jacksonville, who dissolved his bichloride of mercury in peroxide of hydrogen, and as most of you know, peroxide of hydrogen is slightly acidulated, in most cases, to prevent its decomposition. Dr. Black has never found occasion to abandon the use of bichloride of mercury dissolved in peroxide of hydrogen, on account of its insufficiency for the destruction of micro-organisms found in the human mouth.

The general subjects treated by the secretary have been very well discussed, and he has made a very excellent *résumé* of what he had to say. The point that I desired most discussed, the use of europhen and trichloracetic acid, has been lost sight of, except by Professor Peirce. For the benefit of those gentlemen who did not hear the paper, and who are going home to make renewed efforts to do the very best possible for their patients, I will simply say that europhen is an agent that is destined to take the place of iodoform ; that it is almost non-odorous, non-poisonous, five times lighter, and will answer admirably for all of the cases that iodoform has been used for. Trichloracetic acid, as Professor Peirce has stated, and as I have frequently demonstrated, is very useful for the solution of those particles of serumal and sanguinary deposits on the roots of teeth that are almost inaccessible ; and it is useful as a stimulant and astringent, and to check the production of pus from the so-called pyorrhea pockets, or elsewhere on the mucous membranes of the mouth ; and that it is a very excellent refrigerant mouth-wash in all inflamed conditions of the mucous membrane, when other and more powerful agents are not indicated,—as a mouth-wash, one-half to one per cent. in water. It is freely soluble in water, and for the dissolution of deposits on the roots of teeth a ten per cent. solution in water may be used, and then it may be antidoted with a solution of bicarbonate of soda, or any approved alkaline solution that you may have at hand.

SECTION IV.

HISTOLOGY AND MICROSCOPY.

VERBAL REPORT BY FRANK ABBOTT, CHAIRMAN OF THE SECTION.

DR. ABBOTT: Mr. President, I regret that I am compelled to appear before you to-day with nothing but a report of progress. I have been trying for months past to have an instrument made that I could not otherwise obtain, for illustrating certain work that I was doing. I have been delayed in obtaining the instrument to such an extent that it has been impossible for me to get a paper ready. Not until two or three weeks ago did I get the instrument at all. I hope and expect to be able another year, or at some future time, to show something that will be both interesting and instructive from its work. It is a camera for making photo-micrographs, which we could not get anywhere either in New York, Boston, or Philadelphia. I have had it made to order. I expect with it to produce some excellent results,—something that will clear up some points in reference to pathology that we have not been able to satisfy ourselves upon. We have, however, one paper which is not exactly histological nor microscopical, but I think it will be interesting from a histological standpoint. It is a volunteer paper, offered by a gentleman who will read it with your permission, and who will show casts illustrating the paper. It is one of the most interesting cases I have ever heard of. Mr. President, I have the pleasure of introducing Dr. Stainton, of Buffalo, New York.

SECTION IV.—Continued.

Crownless Teeth.

By C. W. STAINTON, of the Section.

IT has been my fortune to have in my practice a family presenting some traces of heredity rather unusual in their character. I exhibit to you casts of the mouths of three members of this family, being one-half of the children in it. The peculiar hereditary strain is the absence of crowns to their teeth.

The history of the condition is, as usual, quite meager. The father is an intelligent man of business, one of the prominent men in a large city, of good physical organization, and the father of six children by two marriages. By the first marriage he had three sons; the eldest has splendid teeth; the second and third sons are specimens of this peculiar condition, and I exhibit the casts of their mouths, marked 1 and 2. By the second mother there were two daughters and one son; the eldest by this second marriage, a young lady of eighteen, is the case presented in cast No. 3.

The history, unsatisfactory from a professional standpoint, but, as Dr. Talbot says, "as good as one ever gets," is about like this: The maternal grandmother had such teeth; she inherited them. Back of that the line is broken. Whether any of her brothers or sisters had such teeth is unknown. The only certain point the father knows is that he got this condition from his mother's side; that she inherited it also. His mother had eight children; his teeth were the poorest in the lot. Two others had very poor teeth, but whether they were wholly crownless like his is uncertain. His idea is that four of the eight had very good teeth, one middling, and three poor. That is all the history I can give you.

When I first became acquainted with the father, about twenty

years since, he was wearing an upper denture which articulated against a few scattered roots in his lower jaw. I have made him in that time two full dentures, opening his mouth probably three-eighths of an inch, improving greatly the contour of his face by removing the too near proximity of the nose and chin.

This peculiarity, the shortening of the facial contour, the causation of which will be apparent to all, is the chief distinctive feature or deformity in all these cases. It is especially apparent in the third case, the well-developed miss of eighteen years, because the shortening of the face is accompanied by a retreating chin. (See Model No. 3.)

The first case, that of the second son, came under my observation in 1879. He had occasion to come in several times because some of these roots became sore and troublesome. I removed two at different times for this reason. In the summer of 1881, he having become eighteen years of age, and his mouth apparently well developed, I extracted the roots in the upper maxilla at the beginning of

FIG. 1.

the summer vacation, and at the beginning of the September following made him a set of teeth. He had been waiting with great impatience for this time to come. It was almost impossible to articulate satisfactorily, and his course in elocution at the normal school had been largely a failure because the tongue had no front teeth to assist in the formation of certain sounds. His personal appearance was greatly improved; the shortened face became at once nearly normal, and the improvement in speaking and singing was very marked.

I do not think there has been any arrest of development of the arch in this case, although that is an assumption and not a matter of positive knowledge. He is not wearing the original plate,—a fit of nausea in April, 1889, over an open water-closet, separated forever this plate and the owner. He claims, however, that it fitted all right. You will see, when you look at the model of this mouth, No. 1, a most remarkable antagonism. Two surfaces could hardly be in more perfect apposition; he could almost bite a thread off

anywhere about the ridge. The roots extracted in this case were very imperfectly developed, and were loosely attached to their sockets,—so much so that I extracted them all at one sitting, without an anesthetic and without any complaint on the part of the patient. Many were like loose deciduous teeth.

The third son, seeing the improvement in his brother's condition, was desirous of some such treatment; but on account of his youth I kept him waiting until he became eighteen years of age, when, in October, 1885, I made him an upper plate. The model shown of this case, No. 2, is not so perfect a representation of the conditions as it ought to have been. I forgot to take an impression of his teeth until after I had extracted several of the roots.

With a remembrance of the ease with which I had extracted the roots in the first case, I tried to extract these, with the assurance that it would not be very tedious to the patient; but I found these roots better developed and very adherent, so that it was extremely difficult

FIG. 2.

to extract them at all, and after removing the roots of the incisors and the bicuspids of one side, I ground off the remaining roots and made a plate over them.

The model in this case shows the condition after the mouth was prepared for a plate, and not, as it should, before anything was done. A peculiar condition in this case was that the front roots could not be made to touch each other. Of course my model makes this condition more pronounced, because the roots of the incisors are gone, and some absorption has taken place in the few months between extraction and the taking of the impression, and I have also smoothed off the roots of the cuspids. But he never was able to get the incisors within a line or two of each other; and yet see how smooth the lower roots have become, and these have not been touched by the wheel.

The making of a denture for this case was not nearly so easy as for his brother. To open the bite sufficiently for anything between

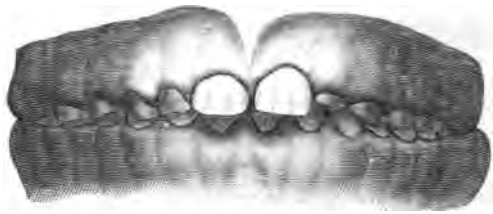
the molars made the incisors too prominent for a mouth never showing any, and with a lip that lifted as far as the nose would allow at the slightest provocation. My first attempt was not satisfactory, but a second was fairly successful. This patient is one of those who will crack nuts, bite hard candy, etc., with his teeth, so that I have had to replace his plate, made in 1885, simply because he had cracked these thin, pinless molars all to pieces.

Model No. 1 shows apparently purely mechanical abrasion.

Model No. 2 shows the same condition posteriorly, but the anterior roots show chemical rather than mechanical abrasion. This subject tells me he never has been able to bite anything with his front teeth, as they never came together.

Model No. 3, that of the miss of eighteen years, shows what neither of the others shows : a fairly good crown to each central incisor. This model is articulated with her mouth at rest, but she has a rather

FIG. 3.



unusual ability to project the lower jaw. This case seems to show that there was an effort to produce crowns, but so poorly were they organized that they have been easily obliterated ; what is left of the centrals is simply for the reason that she cannot project the lower jaw sufficiently to wear these away. This model shows plainly another thing : the presence of decay among these teeth. The first permanent molars above and the first and second permanent molars on one side below show extensive caries ; there is almost no trace of caries in the other cases. There has been no attempt to do anything in this case. The two central incisors give some appearance of teeth, although they are quite discolored. The young lady assures me that she is going to let them go as they are as long as she lives.

In all these mouths the color of these roots runs from a dark amber to that of an old clay pipe black with nicotine. I have known all these cases since they began to get their permanent teeth. Their teeth have always presented this same crownless appearance ; but I

am persuaded that the effort was made to give them normal crowns, but so soft were they that they were soon worn smooth. The lower wisdom-teeth in Nos. 1 and 2, as also several of the teeth in No. 3, are indicative of this. Case No. 1 has apparently transmitted this trait to his children. A little son about four years old has crowns to the deciduous teeth so poor that they have dissolved off almost as soon as they appeared through the gums. Of course, we can only conjecture what the permanent teeth will be, but the father has no faith that they will be any better than his own, and I think he has reason to fear this.

DISCUSSION.

DR. ABBOTT : The history of this case carries us back to the study of embryology, or the time of development of these teeth. Imperfect calcification of the enamel, and probably the dentine, was the condition first presented. The question as to how it occurred, or what caused it, perhaps we shall be unable to determine ; but that the enamel-organ was in a condition to not properly perform its function,—the deposition of lime-salts—there is no doubt. It is a peculiar case of heredity, if heredity can be established. We find isolated cases once in a while, however, where every tooth in the mouth is presented in very much the condition that these were. It is a case of imperfect calcification of the enamel. What arrested the functional action of the enamel-organ is the question that interests us. In almost every instance of isolated cases where this condition is present it is due to some local disease in the mouth, not to any general disturbance. Unless a disease be very severe and of long continuance, the enamel-organ will not be affected without local inflammation. In nearly all the cases that I have ever seen of the partial or general imperfection of the enamel, I have found it due to some local disturbance of the mucous membrane of the mouth itself.

In studying the subject microscopically and pathologically, I have come to the conclusion that no faulty development of enamel itself follows any disease, as a rule, where the local disturbance is not present. I will give you an example : A little boy came into my office, some years ago, whose front teeth, the upper and lower, one-half the length of them, had no enamel at all upon them. The dentine also seemed to have been affected, as it was about one-half its normal thickness,—the same, I presume, as these were when they came into the patient's mouth. I asked the mother if this child had ever had any serious illness. She said not at all ; that the child had been well since it was

born up to the present time. The father, who is a physician, came in a short time after that, and I said to him that his son's teeth were in a very peculiar condition; that some disease must have affected the teeth during their development. He thought a while, and said no, the child had never been ill. A few days later the mother came in again, and I asked her if she had thought over the matter. She said that she had thought of it, and remembered that the child had had some sort of an eruption upon its head and face, which had penetrated the mouth, which became excessively sore; but it did not make the child ill, so they never considered it as a serious sickness.

Not long since I had a patient presented in my office with every tooth in the mouth of a very dark color, highly pigmented, which indicated that they were imperfectly calcified. Imperfect calcification always invites pigmentation, because the lime-salts are not packed together in the solid manner in which they should be, and the organic substance is in excess. This takes up the coloring matter, and the teeth become dark.

This is a most interesting case. If I had some of the teeth, I would make some sections of them, and study them very carefully, microscopically. I presented this same subject before this body on one occasion,—I think at Minneapolis,—only I did not bring out this one point which I call your attention to, that all these disturbances are due to local manifestations, as a general rule.

DR. PEIRCE: I dissent from Dr. Abbott in his statement that it is the result of local disturbances. So far as the history of this case gives us any information, it seems in these children to have been inherited from the grandmother on the father's side,—the father's mother,—so it must have been brought down in that line from an ancestor who had similar conditions. We have all met with cases the same as this in character. I had one where the mother and father both died with pulmonary disease. All through the period of gestation the mother was upon the verge of the grave. The child was born, and the deciduous teeth were deficient in enamel,—deficient of crowns,—the permanent teeth erupted being the first molars, the incisors, and the bicuspids, and they, like the deciduous teeth, were entirely deficient of crowns. The child died with scarlet fever at twelve, but no enamel was developed, either on the deciduous or the permanent teeth. This was a case directly the result of improper nutrition on the part of the mother during gestation, and on the part of the child during its life, largely because of the inherited predisposition from the parents.

DR. MORGAN: The case presented to us this morning is evidently one of inherited predisposition, where the enamel-organs were imperfect because of the inheritance, coming just as other inherited predispositions or deformities come. But I rose particularly to see if I understood my friend, Dr. Abbott, that conditions very similar to these occur very frequently from local causes and not from general disturbances. I hold they are the result of general disturbances, and especially the result of those diseases which involve the dermoid system. The teeth belong to the dermoid system. I hold that in scrofula and measles and chicken-pox, and I suppose smallpox, if the child suffers with those diseases at the time the enamel is formed, the enamel-organ is of necessity involved, because it belongs to this general system which is involved, and which fails to perform its functions properly, and you have that general condition. We may have that disturbance from local causes, and may have this pigmentation as the result of imperfectly performed function in the membrane which secretes the enamel, the result of local disturbances. A number of cases have occurred in my practice where I had control of children where long-continued and violent inflammation had occurred about the roots of deciduous teeth. I have looked forward with fear and with the expectation of finding the permanent teeth in that vicinity when they should be erupted seriously injured by that local inflammation, and have had my fears realized by finding such teeth discolored in patches, or soon becoming discolored and soon wasting away or decaying, because of imperfect organization, a lack of strength in the bonds of union between the mineral elements of the teeth. I hold to these as general principles: that you may have this trouble as a result of general disturbances, and you also will have it as the result of local trouble.

DR. A. O. HUNT: I simply wish to call your attention to certain things which I have noticed in the models themselves. Everything here indicates that the teeth were fully developed. The function of the enamel-organ does not seem to have been lacking. The writer of the paper, in giving the history of the case, did not describe the topical character, the appearance of the teeth themselves.

I notice that the alveolar process shows a normal development, and each tooth passed along normally in the process of development and eruption; there is no indication of disturbance during this time. The enamel is gone apparently to the gingival margin. I want to ask if the portion extending below the gingival margin and to the neck of the tooth is covered by enamel at all?

DR. STAINTON: The appearance of the whole structure is that of secondary dentine.

DR. A. O. HUNT: The appearance of model No. 1 indicates that at some time in the life of this individual the cutting-edges or grinding-surfaces of these teeth had been longer, and an abrasion had occurred. That was not mentioned in the paper, and I simply want to ask a question in relation to that. Dr. Abbott's statement in the beginning was that the enamel-organ had not been able to perform its functions. It appears to me that the full function of the organ had been exercised in the building of the enamel. Have not outside influences played the important part in removing the lime-salts, either before or after the teeth were entirely erupted?

DR. ABBOTT: So far as these particular cases are concerned, and so far as many others may be concerned, I have no doubt that there may be something in the idea or theory of heredity. As Professor Morgan has stated, there are a great many things inherited by children from their parents, grandchildren from their grandparents, down through three or four or more generations. You know that it is said that "the sins of the fathers shall be visited," etc. I want it distinctly understood that I do not claim, nor does any one, I think, that every child that has scarlet fever, measles, whooping-cough, or even small-pox, has defective enamel. The reason is that the disease does not take hold of the mucous membrane of the mouth severely enough to affect the enamel-organ. Where the severer forms of disease occur in the mouth, defective enamel, and often dentine as well, will be the result.

DR. MORGAN: How about syphilis?

DR. CARROLL: Dr. Abbott, in his effort to account by heredity for the anomaly of teeth erupted without enamel in the case just reported by the gentleman from Buffalo, quotes the ancient Scripture, "The sins of the fathers shall be visited upon the children until the third and fourth generations," which idea was in accord with the belief of the time, that all disease and unhealth was the result of sin. I am reminded of a more recent Scripture, controverting this idea of entailment of disease, in the case where the Great Physician, "As he passed by, saw a man which was blind from his birth, and his disciples asked him, saying, 'Master, who did sin, this man or his parents, that he was born blind?' Jesus answered, 'Neither hath this man sinned nor his parents, but that the works of God should be made manifest in him.'"

I desire that Dr. Abbott and all other teachers in our colleges, as well as the rest of us in the profession, should be accurate in our statements, that our teaching shall accord with the facts and not theories.

If I mistake not in my reading, it is pretty generally accepted now, on the part of astute pathologists, physiologists, and histologists, that we cannot inherit disease, *per se;* that we only inherit a tendency, which under favorable circumstances might develop into disease. This point is well taken by Dr. Morgan in his remarks on this case, suggesting the probability of local disease anterior to the period of eruption to account for the non-development of enamel on the teeth.

"The exception is said to prove the rule." Syphilis may be the exception in disease in the wise ordering of natural law that precludes the possibility of disease in general being entailed, while the exception named holds good for the moral and physical well-being of mankind. It might be cited in illustration of this position that certain demographic diseases, such as tertiary syphilis and leprosy, which probably is the quaternary form of the same venereal disease, works the extinction of its victims, as instanced in the fact that the inhabitants of the Hawaiian kingdom were a healthy, stalwart people, numbering four hundred thousand souls, when so-called civilization was introduced among them, and with it syphilis and leprosy, which depopulated the islands until they number now less than forty thousand inhabitants, mostly diseased, and tending to extinction, unless by isolation and rigid quarantine of the diseased they are saved from this dire end.

In discussing the genesis of disease, it is well to differentiate an inheritance of tendency from actual heredity of disease. The case under discussion, as reported, shows that the grandmother, father, and brother of patient were lacking in enamel-covering to some of their teeth, which is not necessarily a disease, but rather a lack of performance of function. The enamel-organ, that should under favorable circumstances have brought forth perfect enamel, was weak, and under unfavorable circumstances failed to perform its true function; hence lack of enamel-covering to the teeth. The mother during gestation may have been in such a weakened condition as to have affected the enamel-organ, or the child itself may have been affected with some of the eruptive diseases incident to childhood, such as measles or scarlatina, as was indicated by the gentleman who reported the case in his paper, and as a result the form of imperfectly developed teeth shown in the models. I repeat that I do not believe we can inherit disease, such as scrofula, cancer, and consumption, otherwise life would be fraught with a calamitous fatality.

Touching the remedy employed by the essayist for correcting the difficulty, viz, extracting wholesale the imperfectly developed teeth

and inserting dentures, I beg to demur. I think it would have been better conservative dentistry to have supplied a covering to the teeth, as I have done in many cases quite analogous in condition, where teeth were worn down short from mal-occlusion or attrition in tobacco-chewing. This can be very efficiently and successfully done by the system of casting aluminum crown- and bridge-work,—set forth in a pamphlet on that subject,—which telescopes over the partially developed or worn-down teeth, making complete restorations that combine natural appearance with perfect use in mastication.

In reply to Dr. Morgan, who asks me what about syphilis being hereditary, I have to remark that with our present knowledge of the etiology of syphilis, it remains a moot question.

DR. BARRETT: The pitted enamel, imperfect enamel, I cannot conceive to be due wholly to either local or general disturbances. If it be the fact that it is due to general systemic disturbances, whenever there shall have been such a pathological condition as to have produced it in one case, everything else being equal, it will always produce it. There are many of us who have known of instances in which there has been desquamation from scarlet fever and other diseases which has not produced defective enamel. There are cases in which there have been very severe complications from those diseases, and yet the teeth themselves have been perfect. On the other hand, there have been instances in which, so far as we could trace the history, there have been no eruptive diseases of any kind, or they have been of an exceedingly light character, and yet the enamel of the teeth was exceedingly imperfect. If there be a law which governs these cases, it must be unvarying under the same circumstances. If pitted enamel be due to eruptive diseases in one case, then it may always be ascribed to them under the same circumstances, and they will always produce the same result. You can scarcely ask any mother in the land whether there was not, about the time of dentition, some form of eruptive disease in the child, without obtaining an affirmative answer. I appeal to you to know if this is not the case. Almost all children have these diseases,—usually, however, of so slight a character as not to produce any serious pathological disturbance.

There is another point of view in this matter. From the manner in which the enamel is laid down by the enamel-membrane, simultaneously over the whole body of the tooth, the effect of a sudden arrest of nutrition, as from an exanthematous disease, would be an imperfect enamel over the whole surface of the tooth. I cannot conceive that to be the fact. It seems to me we have not

reached the limit of our knowledge in this direction. There is something further which perhaps we do not fully comprehend, but the very fact that defective enamel is usually in ridges and furrows is sufficient evidence to me that it cannot be produced by any temporary change in the general condition of the patient. If it were, let me repeat again, it would affect the whole crown of the tooth. In some cases you find the whole enamel down to a certain point entirely defective, but in many other cases you find it simply a line across the tooth. To my apprehension, this arises more from some defect in the enamel-organ itself than from constitutional disturbances or from local irritation.

I do not affirm that local irritation may not produce a decided effect upon the tooth, but I do contend that it cannot account for all the defects which we see in these cases, and that which we do see is not the natural effect that would be produced by the diseases if the train of symptoms, and the disturbances, were the same as have been described by the speakers who have preceded me. I believe pitted, furrowed enamel is due to a defect in the enamel-organ itself, which has disturbed or perverted its functional activity.

DR. MORRISON: There seems to be a very labored effort to locate the responsibility of this condition. The question is, how to correct the difficulty. The gentleman states how he corrected this particular case. I take issue with the manner in which it was done. In nearly all of these cases which I have seen, the roots are well developed, well formed, and well secured in the jaws, and when that is the case I regard it a great mistake to destroy such foundations and put on any manner of artificial appliance, I don't care how well or how it may be constructed. The proper remedy would be to supplement or to furnish what nature has failed to furnish, and that is to put a good metallic enamel on these roots or crowns. I would suggest to lengthen those teeth probably an eighth of an inch, or possibly they would require a quarter of an inch. Lengthen that bite so much and construct metallic crowns on all these roots, upper and lower, and preserve the proper alignment between the lips. The decision of the young lady in case No. 3 was decidedly wise, in not parting with those stumps.

DR. PATRICK: I believe it is a well-established fact that the teeth of an organism originate and are developed in the same manner as the organism. The dental follicle and the Graafian follicle have their home in the mucous membrane. The egg is simply an organized body growing in the ovary like a tooth in its follicle. They both derive their nourishment through the mucous membrane, and are both

constituents of the whole organism. The Graafian follicle, however, is destined in the course of time to be thrown off; but until that time it is nourished like the dental follicle or any other portion of the body, and is subject to all the morbid conditions that may occur in the body. From the very nature of these conditions, the enamel or the dentine of a tooth could not be affected, excepting in the early stages of its development, when it is in a plastic condition, for a tooth when once formed may be subject to decay or mechanical injury on its exposed surfaces, but it has no power of reparation excepting in its most highly organized constituent, the cementum. I have a number of cases, well observed through a series of years, illustrating defects in the development of the enamel of the first and second sets of teeth. I had in one family three well-defined cases in which the enamel of the teeth was but partly formed, due to the influence of eruptive fevers during their incipient growth.

The mother of these three children, while nursing her oldest boy of seven years through an attack of scarlet fever, contracted the disease herself, she being pregnant at the time; both recovered, and in five months afterward the mother gave birth to a healthy child. Four months after birth the child's incisors made their appearance, all of the enamel defective and entirely absent at the incisive margins.

In the course of six months another child of three years had the measles, and the youngest one contracted the disease.

The youngest of these children is now ten years old. Her succedaneous teeth appeared two years before the usual time, the enamel grooved, pitted, and deficient. Now, the child that had the measles when three years old had good deciduous teeth, but the enamel of the sixth-year molars and of the succedaneous teeth is deficient in quantity, grooved, and granular.

DR. HEAD: I would like to ask if there was anything extraordinary about the mucous membrane of the entire family, either of the father or mother or any of the other children? Since the enamel-organ is formed from the mucous membrane, it might be possible to trace the effect on the enamel from some abnormal appearance in the oral mucous membrane. I am reminded of a case in our own family. A nephew, at the age of three months, had a very severe attack of capillary bronchitis. When his deciduous centrals and laterals appeared there was a distinct band around them completely devoid of enamel. The permanent incisors that have taken their place are in every way normal.

DR. GUILFORD: In looking at the models, it occurs to me that this is simply an exaggerated case of an apparently common condition, and

while, if I understood the essayist correctly, he was under the impression that no crowns ever appeared upon the roots of these teeth, I think the crowns must have been there originally, though poorly formed, and they have since worn off. Most likely there has never been any trace of enamel on them ; but we cannot tell that, as we do not have the natural teeth to look at, but the evidences of attrition are perfectly visible in all the teeth that articulate. If you will notice in model No. 1, the lower molar seems to have cusps fairly well developed. All the rest of them are worn off.

DR. STAINTON : In answer to the question regarding the mucous membrane, I would say that in one case only was there any apparent trouble, and that was probably because the boy almost constantly had a pipe or cigarette in his mouth, and the mucous membrane looked like the white of a boiled egg ; but with all the other members of the family the membrane was always normal, so far as I could judge. You will notice in cast No. 3 the wisdom-tooth which has no antagonist. There was nothing to grind that down. I have known the young man since he was nine years of age, and he has always presented this same appearance of short, ground-off teeth, and he has never had any toothache except twice before the general extraction, and that was caused by some of the roots becoming loose and sore, when I extracted them.

The objection made by Dr. Morrison I expected some one would make, but if the doctor could see the roots he would know that the question of a bridge or of crowns was not to be entertained. The roots were not normal, and two-thirds of them were loose. The young man came to me at the age of eighteen. He was very sensitive regarding his personal appearance, and he could not speak well, though he could whistle splendidly, and I was very glad to help him make a good impression upon the girl he afterward married. His appearance was greatly improved at once, and he has worn the plate with great comfort and satisfaction.

SECTION VI.

PHYSIOLOGY AND ETIOLOGY.

REPORT BY H. A. SMITH, CHAIRMAN OF THE SECTION.

MR. PRESIDENT AND GENTLEMEN OF THE ASSOCIATION: The Chairman of Section VI desires to present the following report:

At the last annual meeting your attention was called to the work undertaken under your direction, by this Section, in examination of prehistoric crania. At this time we are pleased to state that satisfactory progress has been made in these investigations during the past year. Dr. J. J. R. Patrick, curator, will make a report of what has been accomplished; also describe briefly the scheme or methods adopted in his investigations of crania, and suggest a plan for the publication and preservation of data obtained. As the work of examination and tabulation of human crania has proceeded, the members of the Section have become more and more convinced of the great scientific value of these investigations, not only to ourselves and our generation, but also to the generations who may come after us, and that in ordering these researches the American Dental Association has shown the world that it is animated by the true scientific spirit.

We have also to report that a paper has been submitted to us by Dr. J. D. Patterson, of the Section, entitled "The Effects upon the Tissues of the Oral Cavity produced by the Internal Administration of Certain Drugs," and recommend that it be read.

REPORT AS TO FUNDS.

Balance reported August, 1891	$13.25
Amount appropriated August, 1891	500.00
" received by Dr. Patrick from California State Dental Society	50.00
" received from Missouri State Dental Society	50.00
" received from Dr. C. N. Peirce	5.00
" received from Illinois State Dental Society	5.00
	$623.25
Amount expended by Dr. J. J. R. Patrick since last report	225.05
Balance	$398.20

SECTION VI.—Continued.

Examination of Pre-historic Crania.

REPORT BY JOHN J. R. PATRICK, CURATOR OF THE INVESTIGATION.

GENTLEMEN: I have the honor to submit herewith the report of progress made in the examination of human crania in the several museums of the United States.

It seems proper to state that much time has been consumed in arranging the records in order to fit them for publication and future reference. The bound records are too cumbersome for publication in our Transactions, as some of the phenomena observed and provided for in the tables do not occur oftener than once in one thousand; yet provision had to be made for these on every page. Many valuable observations that could not be represented by symbols are recorded in the bound volumes under the head of "Remarks," provided for on each page of the records, and these remarks must find a fitting place and connection in the final record of the investigation in our Transactions.

This condition of things necessitated the production of additional tables to carry the observations made under the heads of remarks and the symbols on the diagrams of the original record.

By this arrangement the necessity of using the diagrams in the records of our Association will be obviated, and the use of one page for each examination will be dispensed with. The publication of tables in our Transactions from year to year would encumber the volumes with many folding plates, and make the record of the investigation disconnected, and therefore unsatisfactory for a work of reference. I therefore respectfully recommend that the publication of the tables, catalogue, and record numbers of the crania in the several collections in our museums be dispensed with in our annual reports, and a separate volume be published as an appendix to our Transactions at the

close of the investigation,—a volume that will be a complete index to all the crania that have been examined.

During the progress of the investigation all the phenomena observed will be embodied in the text of the reports, under their proper headings, and will be an abstract of the volumes of the records.

Abstract of the first eight volumes, recording the condition of the teeth and jaws of human crania in the Peabody Museum of Harvard University, tabulated by Dr. R. R. Andrews, Dr. Jos. King Knight, and Mr. G. W. Newton, anatomist.

ANCIENT PERUVIANS.

Superior Maxillæ.

Number of maxillæ examined	408
Number of decayed teeth observed	189
Number of decayed teeth on the right side	93
Number of decayed teeth on the left side	96
Inclusion of teeth	88
Diminution in number of teeth	87
Teeth lost *ante-mortem*	1027
Teeth lost *ante-mortem* on the left side	522
Teeth lost *ante-mortem* on the right side	505
Teeth lost *post-mortem*	3343
Malposition of teeth	8
Malposition by transposition	1
Supplemental teeth	13
Multiple tubercles	13
Aberrant teeth	2
Teeth rotated	24
Horizontality of teeth	20
Cysts the result of alveolar abscesses	357
Perforated antrums	33
Roots of teeth convergent	33
Roots of teeth divergent	45
Prognathous	5
Orthognathous	4
Isognathous	9
Hypertrophy of alveolar border	1
Enamel of teeth pitted	22
Crescentic teeth	10
Granular teeth	5
Salivary calculi	14

Inferior Maxillæ.

Number of maxillæ examined	110
Number of decayed teeth	48
Number of decayed teeth on the right side	23

Number of decayed teeth on the left side	25
Inclusion of teeth	14
Diminution in number of teeth	14
Teeth lost *ante-mortem*	187
Teeth lost *ante-mortem* on the right side	91
Teeth lost *ante-mortem* on the left side	96
Teeth lost *post-mortem*	845
Malposition of teeth	4
Teeth rotated	14
Horizontality of teeth	14
Cysts the result of alveolar abscesses	30
Roots of teeth convergent	7
Roots of teeth divergent	3
Hypertrophy of alveolar border	4
Enamel of teeth pitted	15

CALIFORNIA INDIANS.

Superior Maxillæ.

Number of maxillæ examined	159
Number of decayed teeth observed	30
Number of decayed teeth on the right side	12
Number of decayed teeth on the left side	18
Inclusion of teeth	5
Diminution in the number of teeth	31
Teeth lost *ante-mortem*	417
Teeth lost *ante-mortem* on the right side	196
Teeth lost *ante-mortem* on the left side	221
Teeth lost *post-mortem*	780
Malposition of teeth	2
Multiple tubercles	8
Aberrant teeth	1
Teeth rotated	17
Horizontality of teeth	4
Cysts the result of alveolar abscesses	154
Perforated antrums	11
Roots of teeth convergent	8
Roots of teeth divergent	1
Prognathous	4
Orthognathous	14
Isognathous	33
Enamel of teeth pitted	45
Salivary calculi	42

Inferior Maxillæ.

Number of maxillæ examined	87
Number of decayed teeth observed	31
Number of decayed teeth on the right side	15
Number of decayed teeth on the left side	16

Inclusion of teeth	4
Diminution in the number of teeth	43
Teeth lost *ante-mortem*	157
Teeth lost *ante-mortem* on the right side	75
Teeth lost *ante-mortem* on the left side	82
Teeth lost *post-mortem*	383
Teeth rotated	17
Horizontality of teeth	8
Cysts the result of alveolar abscesses	64
Roots of teeth convergent	17
Enamel of teeth pitted	2
Salivary calculi	11

STONE-GRAVE INDIANS OF TENNESSEE.

SUPERIOR MAXILLÆ.

Number of maxillæ examined	71
Number of decayed teeth observed	37
Number of decayed teeth on the right side	17
Number of decayed teeth on the left side	20
Inclusion of teeth	3
Diminution in number of teeth	10
Teeth lost *ante-mortem*	106
Teeth lost *ante-mortem* on the right side	59
Teeth lost *ante-mortem* on the left side	47
Teeth lost *post-mortem*	424
Malposition of teeth	3
Multiple tubercles	3
Teeth rotated	6
Cysts the result of alveolar abscesses	31
Perforated antrums	3
Constriction of the maxilla	1
Roots of teeth convergent	9
Roots of teeth divergent	3
Prognathous	1
Orthognathous	18
Isognathous	34
Enamel of teeth pitted	39
Salivary calculi	47

INFERIOR MAXILLÆ.

Number of maxillæ examined	68
Number of decayed teeth	37
Number of decayed teeth on the right side	15
Number of decayed teeth on the left side	22
Inclusion of teeth	6
Diminution in number of teeth	7
Teeth lost *ante-mortem*	117
Teeth lost *ante-mortem* on the right side	59

Teeth lost *ante-mortem* on the left side	58
Teeth lost *post-mortem*	342
Malposition of teeth	1
Supplemental teeth	1
Teeth rotated	7
Horizontality of teeth	13
Cysts the result of alveolar abscesses	21
Roots of teeth convergent	5
Roots of teeth divergent	1

MASSACHUSETTS INDIANS.

Two Superior and Two Inferior Maxillaries.

Number of maxillæ examined	4
Number of decayed teeth	8
Number of decayed teeth on the right side	4
Number of decayed teeth on the left side	4
Number on the lower maxillaries	3
Number on the upper maxillaries	5
Teeth lost *ante-mortem*	11
Teeth lost *ante-mortem* on the right side	6
Teeth lost *ante-mortem* on the left side	5
Teeth lost *post-mortem*	7
Malposition of teeth	2
Cysts the result of alveolar abscesses	3
Orthognathous	1
Isognathous	1

TIERRA DEL FUEGAN.

One Inferior and One Superior Maxillary.

Number of maxillæ examined	2
Teeth lost *post-mortem*	11
Roots of teeth convergent	1

MEXICAN.

Two Inferior Maxillaries of a Zacatecan.

Number of maxillæ examined	2
Teeth lost *ante-mortem*	6
Teeth lost *ante-mortem* on the right side	4
Teeth lost *ante-mortem* on the left side	2
Teeth lost *post-mortem*	3
Enamel of teeth pitted	1

COAHUILAN.

Superior Maxillæ.

Number of maxillæ examined	9
Number of decayed teeth	1
Number of decayed teeth on the right side	1

Inclusion of teeth	3
Diminution of teeth	1
Teeth lost *ante-mortem*	1
Teeth lost *ante-mortem* on the right side	1
Teeth lost *post-mortem*	40
Cyst the result of alveolar abscess	1
Orthognathous	2
Isognathous	5
Enamel of teeth pitted	17

Inferior Maxillæ.

Number of maxillæ examined	7
Number of decayed teeth	2
Number of decayed teeth on the left side	2
Inclusion of teeth	2
Teeth lost *ante-mortem*	1
Teeth lost *ante-mortem* on the left side	1
Teeth lost *post-mortem*	23
Horizontality of teeth	1
Cyst the result of alveolar abscess	1

CENTRAL AMERICAN.

Guatemalan Superior Maxilla.

Number of decayed teeth	2
Number of decayed teeth on the right side	1
Number of decayed teeth on the left side	1
Teeth lost *post-mortem*	4
Teeth rotated	1
Orthognathous	1
Aberrant tooth	1
Enamel of teeth pitted	3

Inferior Maxilla.

Teeth lost *post-mortem*	6

NICARAGUANS.

Superior Maxillæ.

Number of superior maxillæ examined	9
Diminution in number of teeth	2
Teeth lost *ante-mortem*	45
Teeth lost *ante-mortem* on the right side	26
Teeth lost *ante-mortem* on the left side	19
Teeth lost *post-mortem*	73
Multiple tubercles	1
Cysts the result of alveolar abscesses	2
Antrum perforated	1
Isognathous	5
Enamel pitted	1

INFERIOR MAXILLÆ.

Number of inferior maxillæ examined	11
Number of decayed teeth	5
Number of decayed teeth on the right side	3
Number of decayed teeth on the left side	2
Teeth lost *ante-mortem*	28
Teeth lost *ante-mortem* on the right side	14
Teeth lost *ante-mortem* on the left side	14
Teeth lost *post-mortem*	99
Teeth rotated	1
Horizontality of teeth	4
Cysts the result of alveolar abscesses	2
Enamel of teeth pitted	1

In order to obtain a true percentage of the decay or disease of the teeth, I have found it necessary to give to each maxilla examined its full number of teeth, and then deduct the number of "included teeth," the "diminution in the number of teeth," and those teeth lost *post-mortem* from the full number of teeth found in the normal human adult jaws.

The teeth lost *ante-mortem*, though not present for examination, were either decayed or necrosed, as the cysts and other indications of the processes reveal; they are therefore classed with the decayed teeth. Those teeth lost *post-mortem*, it is fair to presume, were decayed to the same extent as the teeth remaining in the processes, but as there were no traces of disease in the processes from which they were dislodged, they are not included in the calculations for the percentage of decay.

It has not as yet been determined which series of teeth, the superior or the inferior, is the first to succumb, or which side, the right or the left, endures the longest. I will therefore give the percentage of decay in these different regions, in the hope of throwing some light on these doubtful questions.

Total Number of Upper and Lower Teeth Examined, and the Percentage of Disease in Each.

Total number of teeth examined	8481
Total number of teeth diseased	2493
Total percentage of diseased teeth	29.4

TOTAL NUMBER OF UPPER TEETH EXAMINED.

Number of teeth examined	5655
Number of teeth diseased	1866
Percentage of diseased teeth	33.

TOTAL NUMBER OF LOWER TEETH EXAMINED.

Number of teeth examined	2826
Number of teeth diseased	627
Percentage of teeth diseased	22.2

TOTAL NUMBER OF TEETH DISEASED ON THE RIGHT AND ON THE LEFT.

Number of diseased teeth on the left side	1273
Number of diseased teeth on the right side	1220
Excess in percentage of the left over the right	4.17

ANCIENT PERUVIANS.

PERCENTAGE OF DISEASE.

Number of teeth examined	3439
Number of teeth diseased	1451
Percentage of teeth diseased	42.2

CALIFORNIA INDIANS.

PERCENTAGE OF DISEASE.

Number of teeth examined	4770
Number of teeth diseased	1741
Percentage of teeth diseased	36.7

STONE-GRAVE INDIANS OF TENNESSEE.

PERCENTAGE OF DISEASE.

Number of teeth examined	1295
Number of diseased teeth	297
Percentage of diseased teeth	23

AVERAGES OF MEASUREMENTS FOR THE WIDTH OF ARCH AND DEPTH OF PALATE.*

TIERRA DEL FUEGAN.

	Millimeters.	Inches.
Width of arch, 1 measured	34	1.375
Depth of palate, 1 measured	29	1.14

*The measurements are made in inches, afterward converted into millimeters, sometimes by the examiner, but mostly by myself, especially in the later examinations. There are no fractions of millimeters; hence these are approximations only, while the measurements in inches are supposed to be exact or nearly so; at least to $\frac{1}{64}$ of an inch in the first and to $\frac{1}{32}$ of an inch in the later examinations.

25 millimeters	=	.	.	1 inch.	37 millimeters	=	.	.	1.48 inch.
35 "	=	.	.	1.4 "	38 "	=	.	.	1.52 "
36 "	=	.	.	1.44 "					

So that a measurement between 1.4 and 1.44 inches would be 35 or 36 millimeters. One measurement between 1.48 and 1.52 inches would be 37 or 38 millimeters, as the inches are nearer 1 48 or 1.52.

	Millimeters.	Inches.
Massachusetts Indians.		
Width of arch, 2 measured	37	1.5
Depth of palate, 1 only	28	1.1094
Peruvians.		
Width of arch, 356 measured	38	1.504
Depth of palate, 327 measured	26	1.0545
Peruvian Children.		
Width of arch, 2 measured	30	1.22
Depth of palate, 2 measured	29	1.172
Mexican Coahuila.		
Width of arch, 8 measured	38	1.591
Depth of palate, 8 measured	25	1.00
Mexican Children.		
Width of arch, 2 measured	35	1.422
Depth of palate, 2 measured	14	.595
Californian.		
Width of arch, 162 measured	35	1.415
Depth of palate, 144 measured	27	1.099
California Child.		
Width of arch, 1 measured	31	1.25
Depth of palate, 1 measured	36	1.438
Stone-Grave Indians of Tennessee.		
Width of arch, 40 measured	38	1.494
Depth of palate, 26 measured	31	1.26

Total measured for width of arch, 574. Total measured for depth of palate, 512.

The average measurement for width of arch of 569 adults is 1.163 inches, or 29 millimeters.

The average measurement for depth of palate of 507 adults is 1.041 inches, or 26 millimeters; a difference of 3 millimeters, or $\frac{122}{1000}$ of an inch.

MAXIMUM AND MINIMUM DEPTH OF ARCH AND WIDTH OF PALATE.

	Millimeters.	Inches.
Greatest width of arch	45	$1\frac{3}{16}$
Greatest depth of palate	34	$1\frac{1}{2}$
Least width of arch	32	$1\frac{1}{4}$
Least depth of palate	20	$\frac{51}{64}$

In volume vi, pages 78 and 79, are two instances in which the measurements for depth of palate are equal and the width of arches

are equal. It is worthy of remark that the width of arch of a child in the region of the second deciduous molars is equal to that of most adults in the region of the first permanent molars; but the palate of the child is never as deep.

NOTES ON ANOMALIES.

PERUVIAN.

Vol. i, pages 8, 17, 29. There are ten cases of crescentic enamel.

Vol. i, page 14. Confusion of the left superior, second bicuspid, and first molar.

Vol. ii, page 14. Diastema in region of the superior cuspids and bicuspids.

Vol. ii, page 16. Diminution of superior right and left third molars and the central incisors.

Vol. ii, page 41. Diastema in region of superior right and left cuspids.

Vol. ii, page 60. Diastema in region of inferior cuspids and bicuspids.

Vol. iii, page 32. A remarkably formed superior maxilla, the tuberosities of the process approximating, the arch forming almost three-fourths of a circle.

Vol. iii, page 28. Malposition by transposition. The right superior cuspid is between the first and second bicuspids in line, and the left cuspid is crowded out of place by a supplemental tooth.

Vol. iii, page 66. The right cuspid is included in the palate, the crown directed inward and forward behind the lateral incisor.

Vol. iii, page 96. Deciduous teeth of a child, decayed.

Vol. iv, page 55. The right cuspid is included, the crown directed to the posterior as far back as the second bicuspid; the third right molar is also included, its crown directed to the posterior, and the crown of the left third molar is directed to the posterior, but not included.

Vol. iv, page 65. Nanism. The right cuspid is very small,—much smaller than the left.

Vol. iv, page 83. Two supplemental teeth, the left one in alignment, and the right one included below the central and lateral incisors; they have caused the teeth to move from the left to the right side, producing asymmetry of the arch, the left-side molar being opposite the right second bicuspid.

Vol. iv, page 94. One left supplemental lateral incisor.

Vol. v, page 6. A very small skull, supposed to be a dwarf. The measurements of the arch are not proportionately small. Width of palate 37 millimeters, depth of palate 21 millimeters.

Vol. v, page 55. Diastema between superior left cuspid and lateral incisor.

Vol. v, page 79. Diminution of the four superior incisors, and the third right molar included beneath the second molar.

Vol. v, page 77. The left superior cuspid is horizontal; its crown is directed to the posterior, and rests directly above the first molar beneath the projection of the malar process.

Vol. v, page 81. Geantism. The first superior molars are very large, the crown of one being 12 millimeters square.

Vol. v, page 94. The right superior cuspid is directed forward, the crown appearing above the central incisor at the nasal process.

MEXICAN.

Vol. vi, page 11. Inferior right cuspid and bicuspid are horizontal, their crowns directed toward the median line, and are imbricated.

Vol. vi, page 19. The lower incisors imbricated.

CALIFORNIAN.

Vol. vi, page 52. The two upper and two lower central incisors never present.

Vol. vi, page 95. The remains of deciduous teeth present.

Vol. vii, page 14. An enamel nodule on the cervical border of the right third superior molar.

Vol. vii, page 18. Enamel nodules on the cervical borders of the superior third molars.

Vol. vii, page 31. Enamel nodule on the cervical border of the right first bicuspid.

Vol. vii, page 48. The left superior central incisor has doubled up upon itself, the crown directed upward, presenting its posterior surface to the anterior, its crown coming out between the nasal and the lower margin of the alveolar process.

Vol. vii, page 50. The superior maxilla has ten cysts, the inferior five, the result of alveolar abscesses; the teeth all present with the exception of four; they are badly worn and necrosed. It will be observed that the percentage of decayed teeth in the California Indians is much less than in the Peruvians, but the ravages of alveolar abscesses leaving cysts in the process are greater in the Californians. The difference in the character of diseased teeth in the two races is easily accounted for if we consider their environment; the Californian being confined to the sea-coast, large quantities of siliceous material were ever present in his food, which produced the worn condition of his teeth, the destruction of their pulps, and final necrosis.

Vol. vii, page 53. The two deciduous inferior right lateral and central incisors fused together.

Vol. vii, page 70. One deciduous molar present in adult, much worn, and no sign of its successor, the superior second left bicuspid.

Vol. viii, page 17. Diastema on left side between the inferior bicuspids.

Vol. viii, page 9. The inferior left deciduous molar present, and no indications of its successor; adult.

Vol. viii, page 36. The upper and lower teeth in good condition, and all present with but one decayed in the lower; this is the one exception of a good set of teeth.

Vol. viii, page 41. The second and third inferior molars are fused together at their roots, and the left second bicuspid is imbedded in the crown of the first molar, but not confused with it.

The importance of this investigation cannot be over-estimated, especially that portion relating to disease and anomalies of the teeth

and jaws ; for there is not a question that may arise in morphology, histology, or physiology on which the facts revealed in this investigation will not shed some light. A number of crania examined are recorded as "Mound-Builders" for no other reason than that they were taken from mounds. There are no valid reasons for separating the so-called "Mound-Builders" from the ancestors of the present races of Indians, seeing that we have the statements of early European adventurers that the American Indians when first observed were active mound-builders.

Many of the crania are recorded as the crania of females, without sufficient data. I have been unable to discover any anatomical difference in the male and female crania whereby the sex may be determined, nor have I found any one, after diligent inquiry, who has been able to furnish a key to the solution of the question ; size is no indication of sex.

The depth of palate bears no proportion to the size or breadth of the arch. Some of the narrowest arches have the deepest palates, and some of the shallowest palates have the broadest arches, which renders it impossible to arrive at any rule governing proportion, a fact well known to anatomists ; for it has long been established that the size of the teeth in human beings varies, and has no proportionate relation to the size of the body ; thus, small persons have frequently very large teeth, while persons of colossal size often have narrow and small teeth. Large persons usually have large jaws, but the teeth do not correspond to the size of the jaws as often as the jaws correspond to the size of the body, either in large or small persons. There are large jaws with small teeth, and small jaws with large teeth ; the latter occur more frequently in small persons, while they are of rarer occurrence in large persons. It appears to be impossible to establish any rule for proportion of parts by the measurement of any portion of the human body.

DISCUSSION.

DR. PEIRCE : There is nothing to discuss in the paper, except to emphasize the fact of the labor that has been employed in procuring these statistics. I know something of that labor, because some little of it was under my supervision in obtaining an account of the crania of the Academy of Natural Sciences in Philadelphia. I employed two young men, the Ives brothers, who are experts in handling specimens, and after spending three afternoons with them they pursued the work alone, and it took them nearly a month to go over twelve

hundred crania and give the different conditions noted in the table this evening.

A word regarding the measurements. While they could give the position and abnormal condition of every tooth, or the loss of a tooth, the number of teeth, twisted or reversed, when they came to the measurements I saw what folly it was, because a large majority of the specimens were those of advanced years, and in many the teeth were elevated, and then again the teeth varied so much in size that the measurement from the first molar to the opposite molar would vary much, in consequence of the elevation of the teeth, or their varying size ; hence you got no correct idea of the width of the palate. So the measurements, I should say, are of very little value, as compared with the amount of labor involved, and the amount of labor the doctor has bestowed in trying to give us a table which can be placed in an appendix to the journal almost equals that employed in taking the original measurements and the conditions of the teeth. You can hardly imagine the amount of work he has had to perform in giving us the little summary which he read just now of the results of the four hundred crania. I might say further that the value of this when it is done, it seems to me, will be very great, because it will give us a very definite idea of the conditions of the teeth of ancient peoples, and enable us to compare them with those more modern.

DR. H. A. SMITH : I think when this work is completed we shall be very likely to have some of our notions disturbed in reference to the frequency of caries in the present time as compared with the ancient.

Although but a limited number of crania have been tabulated, you will notice that all the lesions that are present in our race to-day were present at least in a great number of those pre-historic crania ; and it would seem, if we were to draw any deductions from the report made, that caries was almost as prevalent at that time as it is at this, and that caries of the teeth is not a disease of civilization. And so we are likely, if this work goes on, to have our views disturbed in that direction ; and if we do no more than establish that fact, of what great value it will be to us. Take the list of teeth tabulated, look at the large number of teeth lost before the death of the person, showing clearly that abscess and all the other lesions which cause the loss of teeth to-day were present in those persons to a very large degree.

In reference to the measurements given, you will notice from his remarks that Dr. Patrick has very little faith that we can establish any very valuable deductions by these measurements. I am pleased,

however, that he has concluded to make these measurements of the maxillaries. They will at least give us fresh data to be used in proving or disproving the theory that certain mental qualities in the race or in the individual are always associated with peculiarities in development and shape of the jaws. This work of tabulation, in my judgment, is being so thoroughly done that for hundreds of years, if ever, it will not have to be done again. It is a work that will not only be a monument to Dr. Patrick, but to the American Dental Association.

DR. OTTOFY: I was pleased with the report as far as it goes, and am quite well satisfied, from the statistics that have been read, that when the report covers the field which it eventually will, it will be probably the grandest work this or any other dental association has ever undertaken.

It is interesting to notice the various deformities and conditions that have existed in pre-historic times that we know do now exist. Not only this, but there is a decided advantage in going over crania in a search for these things, because much that in life is covered by gum-tissue can be seen in the naked cranium. I am heartily in favor of continuing the work as carefully as Dr. Patrick has done it up to the present time.

SECTION VI.—Continued.

The Effects upon the Tissues of the Oral Cavity produced by the Internal Administration of Certain Drugs.

PAPER BY J. D. PATTERSON, OF THE SECTION.

THE importance of this subject can scarcely be questioned by the observant dental practitioner, for he is almost daily brought into contact with certain diseased mouth conditions which are popularly believed to be the result of medication for certain constitutional or systemic conditions. This belief has been so long established, has been so fostered and taught by the physician as well as the dental practitioner, that it would be surprising if errors had not crept into or become coupled with the science of the question.

While listening to the history of cases as given by intelligent patients whose dental arches and surroundings have succumbed to disease, we find in very many cases that the inception of the trouble is firmly fixed in the patient's mind, and is believed to have been the result of certain medicines given for systemic effect, which have destroyed both the teeth and the gums and process which surrounded them. Such remarks as the following are very familiar: "My teeth were perfect until my physician gave me medicine during sickness which salivated me," or "I have taken so much iron that it has decayed my teeth." There are many other drugs which are thought to prejudice the integrity of the oral tissues, but the mercurial and iron preparations receive the burden of blame. The former, because the effect comes to the oral tissues alone through its internal administration, and because the belief in its ravages is so general, will receive attention in this essay to the exclusion of other drugs.

"The form in which mercury is given for the constitutional effect is commonly that of chlorides or iodides. A small dose, say one-tenth

to one-twentieth of a grain of the bichloride, is given every three or four hours until the desired effect is produced. The physiological action of mercury is tonic, purgative, alterative, antiphlogistic, and sorbefacient. The metal itself is inert, but by combination with the acids and fluids of the body becomes active, and is easily absorbed, passing into the blood from the stomach, the lungs, mucous membranes, or skin, in each case probably as an oxyalbuminate of mercury. In the blood its effects are tonic in small doses, but in quantity it produces impoverishment, diminishes the red blood-corpuscles, and disorders nutrition. It stimulates the glands of the body, especially the salivary, to the production of pathological secretions. In small doses, administered for a short time, the mercurial preparations are blood tonics, increasing the number of red corpuscles and its general condition. Soon, however, they provoke waste by stimulating the lymphatics, and if the small doses are continued symptoms of so-called mercurial poisoning manifest themselves, and 'hydrargyrism,' commonly called 'salivation,' is exhibited. The symptoms of salivation or hydrargyrism are said to be a fetid breath, swollen and spongy gums, a blue line along the gum-margins, stomatitis, sore and loosened teeth, a metallic taste in the mouth. In extreme cases, ulceration and sloughing occur around the teeth, and the jaw-bone is sometimes laid bare."

The foregoing is in brief a description of the effect upon the oral cavity of the giving of mercury for constitutional effect, as gleaned from medical and dental text-books, and especially from "Potter's Materia Medica and Therapeutics."

My purpose is to study briefly the situation, and to detail some practical experiments testing the truth of some of the usually accepted statements.

Some years ago, having been closely allied with physicians in the care of stomatitis resulting from mercurial poisoning, I began to doubt that the classic symptoms of ptyalism as found in the mouth were *per se* the result of mercury. My attention was first called to "*the blue line*," and text-books signally failed to enlighten me as to why it should be present. Inquiry among all classes of medical practitioners developed a wide difference of opinion about the *blue line*, that invariable symptom of salivation. They declared that it was there, that it was always present in salivation, and that was sufficient for them.

Now, before I knew anything about mercurial poisoning in the earlier years of my practice, I had seen many "blue lines" around gum-

margins as the result of a deposit of calcic matter, which disappeared under dextrous use of a scaler; and I asserted that the blue line was caused by calculus, and was not the result of mercury *per se*. I asked physicians to explain physiologically the presence of this blue line, and the only explanation was from an ignorant practitioner, who asserted that it was caused by the presence of finely divided metallic mercury gathered there from terminal vessels,—a thing utterly impossible, as mercury internally administered cannot reach the gum-tissue in any such form.

I then agreed to entirely obliterate in a single operation such blue lines in any patient brought to me, the patients to be chosen from those who were salivated by prolonged administration of mercurials. In this I was successful.

Finding that the "blue line" was a result of local conditions only, I then began to experiment upon the "inflamed and spongy gums" in salivated cases. I solicited cases of this kind, and stipulated to cure them without withdrawing the mercurial doses if the physicians desired still to continue the mercury-giving. The result was perfectly successful. Under careful removal of all irritant matter, and the institution of perfect hygienic and antiseptic conditions, all swelling and ulceration, save that which was clearly syphilitic, in a few days would disappear: this too, as has been stated, without withdrawal or lessening of the dose of mercury. These experiments, which were carried on for about two years, were made possible from the fact that there were accessible a large number of patients suffering from the specific syphilitic taint under care of specialists.

The conclusions then reached, and which have since been verified, were that "the blue line," "the inflamed and spongy gums," and other of the more serious appearances were the result largely of local irritation, and not of the mercury; that, with proper care, these symptoms which have been and are characterized as symptomatic of mercurial poisoning, may be entirely prevented.

In the condition of salivation we find the oral cavity unusually predisposed to the gathering of local irritant matter. There is an enormous, unusual secretion of vitiated saliva, and the precipitation of calcic matter is much increased. All the buccal secretions are unhealthy, and the condition demands more thorough hygienic care, and usually in such cases receives less; therefore the oral tissues fall a prey, not to the mercury, but to the intensely morbid local condition which the salivated condition has rendered possible. It is a condition similar in some particulars to that of the oral cavity in the

case of pregnant women. The teeth fall a prey to decay in an unusual manner,—not because they are softer at that time, but because "they then need more care and receive less." The fermentative processes are much more active, and the care is in inverse ratio to the needs.

Every observant practitioner must have noticed how closely the condition met with in irritation from calcic matter where there is no mercurial suspicion resembles the condition described in salivation. There is the blue line, the inflamed and spongy gums, sometimes covering the teeth, and ulceration of the gum-margins. The impoverished condition of the blood and the profuseness and character of all oral secretions constitute the chief difference. The unusual and malignant results sometimes occurring in salivation, and which do not appear in calcic irritation, may be safely laid to the unusual predisposition or to the syphilitic condition which usually precedes the giving of mercurials. Indeed, Dr. Ringer, in his "Hand-Book of Therapeutics," says that the phenomena ascribed to mercurials are similar to those which will result from syphilis; and may it not, then, be true that the extraordinary symptoms referred to may be entirely due to the specific poison for which the mercury is given?

The whole question is one of interest and practical value to both dentist and physician. So long as the mercurials hold such an undisputed and merited position in therapeutics, it is of first importance to ascertain, if possible, just what are the evil results following their use.

It has been the purpose of this paper to show that some of the classic signs of mercurial poisoning which appear in the mouth are not symptomatic, but largely local; that the "blue line" is solely and only caused by calcic depositions; that the inflamed and spongy gums are resultant from the same cause, and from other irritant matter, such as fermenting particles of food-matter and mucus, and can be successfully prevented or cured by unusual attention to the removal of irritant matter and the establishment of thorough antiseptic conditions.

It would surely be a boon to diseased humanity if it were known that certain strict treatment of the mouth would prevent destruction of its tissues, when, on account of specific poison, it is desirable to continue potent doses of that prince of germ-killers, mercury. We believe this can be accomplished, and that much of the supposed ravages of mercury upon the tissues of the mouth may be safely ascribed to pure carelessness, ignorance, and neglect.

DISCUSSION.

DR. W. W. COON: I seriously question the statement that the blue line is always caused by deposition of tartar around the necks of teeth. Just before leaving home I took an impression of an edentulous lower jaw, in which there were several bluish deposits, and I remember cases where the necks of the teeth were entirely free from deposits, yet upon holding the gum away from the roots the blue line would show. These were certainly pigmentary deposits, and not the more common pseudo-colorations from underlying tartar.

DR. FILLEBROWN: I agree with Dr. Patterson that these cases of so-called ptyalism depend upon other circumstances, and that we seldom see a case of real salivation, but that many cases of blue line are caused by irritating substances under the edge of the gum.

Lead is supposed to produce a blue line also, but that is not always the cause. I had a patient some years ago whose teeth and gums were in perfect health, so far as I could see, but the blue line was very marked around each tooth. That was about twenty years ago, and the teeth and gums are still healthy. There are various conditions that give rise to many of the phenomena we observe in the human system, and so this blue line may be due to a variety of causes which we cannot always determine.

DR. MORGAN: Did your patient ever use charcoal as a dentifrice?

DR. FILLEBROWN: I think not. I asked her about that.

DR. KIRK: I never have seen a case of mercurial salivation, and therefore do not propose to dwell upon that point, but I should be very glad to hear a description of the conditions produced by it. I believe it to be of rare occurrence in these days of the more intelligent use of mercury. I wish to report a case in which there was a very distinct blue line around the free border of the gum, both above and below, more pronounced in front than upon the posterior surface, which was a case of pigmentation from charcoal, fine particles of carbon being imbedded in the tissue, very similar to the case reported by Dr. Coon. I could in some places, with an instrument, lift the gum away from the teeth, and could then distinctly see through the semi-transparent tissue, where the particles of charcoal were imbedded. The line was very uniform as to demarkation, and was continuous around the whole denture. This patient, who had very fine teeth, had used charcoal as a dentifrice all her life.

DR. H. A. SMITH: Reference has been made to the blue line which we occasionally observe in the gums about the necks of the

teeth where there is no disease. In the few mouths of the African race that I have examined, I have observed that this blue line was to be seen, and I am reminded to speak of this from the fact that I have had in my practice one patient who had this same blue line, which suggested the question if she were pure Anglo-Saxon. If others have observed this same condition in the mouths of white patients, I would like to ask if it occurred to their minds that possibly they were not of pure blood. I will ask Dr. Morgan if this blue line is a characteristic of the African race?

DR. MORGAN: It is one of their characteristics, and in the mixed races which very frequently obtain they are called "the blue-gum niggers," and the negroes have a legend that the bite of a negro with blue gum is death.

DR. SMITH: Does this blue line extend all around the teeth?

DR. MORGAN: Sometimes the entire gum-tissue is pigmented and dark; at other times it is colored in lines near the free margin of the gum, while again it will be observed in irregular patches near the teeth.

DR. SMITH: In the case I have referred to, the pigmentation was largely in the free margin of the gum, not continuously, but in patches.

DR. MORGAN: That is frequently the case.

DR. GEO. E. HUNT: If this blue line is due to the congestion of the part, as Dr. Patterson has said in his paper, it will undoubtedly be visible whenever a low grade of irritation is present, and I think in the majority of cases it is due to this cause rather than to the use of mercury. There would be, doubtless, a greater deposit of salivary calculus during the administration of this drug, owing to the increased flow of saliva.

DR. GRAMM: I had under my care a young girl of most excellent health in all tissues and most excellent parentage, who had this blue line, and I desire to take exception to the essayist's statement that ulceration of the gums is due mostly and largely to the neglect of the teeth or of the mouth under the conditions referred to. We have similar ulceration of the gum-tissue where no specific taint is present. Mercury is given not only in syphilitic conditions; it is quite frequently administered in troubles not at all specific, as dysentery, constipation, Bright's disease, cholera infantum, etc. The essayist compared also the degeneration of the gum-tissue and the alveolar process by mercurialism to the destruction of tooth-tissue during pregnancy. These cases to me seem not at all parallel, since the

causes underlying one condition are entirely different from those affecting the other.

DR. HORTON: I am satisfied that in a very large proportion of these cases the appearance of the blue line can be traced to calcareous deposits. In the case that Dr. Fillebrown mentioned, I am of the opinion that upon a careful examination it would be found that there was a deposit of minute particles of salivary calculus. This case may be an exception; but all cases I ever saw, so far as I can remember, had this deposit. So that while this blue line has been taken by medical authorities to be a conclusive evidence of mercurial irritation, I believe they have overlooked the true cause, and are mistaken in their diagnosis.

DR. FILLEBROWN: If Dr. Horton found a patient eighteen or twenty years old whose teeth and gums were in perfect health, presenting no abnormal appearance except this blue line upon the gums, is he going to charge that to deposits of calculus under the gum that could not be found?

DR. HORTON: It might not be under the gum, but at its margin upon the teeth. I would have the doctor make a very careful examination.

DR. FILLEBROWN: This patient has been continuously under my care, and neither Riggs's disease nor deposits of calculus have developed in the course of twenty years.

DR. HORTON: I am only speaking of my experience.

DR. FILLEBROWN: I am speaking of mine.

DR. KIRK: I have been practicing dentistry about fourteen years, and have never seen a case of mercurial ptyalism. If Dr. Horton has seen fifty, will he not describe the condition? I have just asked Dr. Jack, and he tells me he has never seen a case. For the edification of those of us who have not, I should like to have Dr. Horton describe one of his fifty cases.

DR. CRAVENS: I think in some cases where this discoloration of the gum appears, the patients are in the habit of using soap in washing their teeth, without using powder. In many such cases the teeth will become coated.

DR. BARRETT: I have seen the blue line along the gums at times, which was simply a surface deposit, and it was easily removed. The coloring did not seem to penetrate to any particular depth. It was not, strictly speaking, something that you could wash off, but it could be rubbed off with comparative ease. I never knew to what to attribute that. I cannot conceive that mercurialism should cause the blue

line along the gum. I have seen it cause a purple gum. I have never seen many cases, but enough to lead me to the conviction that mercurialization does produce a decided disturbance in the oral tissues. The peculiar fetor and metallic taste are certain concomitants of ptyalism. The tint is usually a purple color, when I have seen it, and not blue. I have never supposed that mercurialism would cause the blue color, but it will cause a kind of purple pigmentation, not unlike that which is observed in some necrosed conditions of the bone. I do not mean a very dark venous stagnation, but I mean a distinct purple color.

DR. PATTERSON: My friend Dr. Gramm misapprehends the statement in regard to the condition known as salivation being like that in pregnancy. I did not make the statement. I merely compared the two in this way, viz: that in both cases the mouth needed *more care* and *received less*. I did not deny that there may be ulceration from hydrargyrism. There may be a low grade of irritation on account of the impoverished condition of the blood. The gums are pale,—they are not blue,—and I do not see them purple. I see them pale on account of the changed condition of the blood, because the blood is so impoverished when mercurialization is kept up until the desired condition is reached. Small ulcerations may be found in different parts of the body and on the gum-tissue. But my claim has been that the blue line and the inflammation we find in connection with what are called cases of salivation are in a large degree the result of local irritation. The condition of ptyalism, or mercurial poisoning, is not like it. The condition of salivation is merely a condition of enormous secretion of all the secretions of the body due to impoverished blood, but so far as these symptoms of salivation are described by medical men, and to which I have referred, they are not symptomatic of hydrargyrism at all. In my own cases I have proved it so many times. It is difficult to find cases. I was especially fortunate on account of being able to see a great number of cases in the space of about two years in the hands of a specialist, and I made an arrangement with him to furnish such cases to me.

DR. MORGAN: Just a few words on the subject of ptyalism. I was reared in a country where mercurials were given very freely in my younger days, and while I have not seen many cases since I have been a professional man, I have occasionally met with one, maybe twenty in the last twenty years. I have seen it in all its stages. Not a great while since I was called to see a patient and found a portion of the superior maxillary necrosed, the result of ptyalism. There

was considerable ulceration on the palatal surface of the second superior molar, and on testing it I found a portion of the bone loose, and when it came away, it brought away the crown of one of the permanent teeth.

DR. PATTERSON: I have not been discussing the result of the obsolete practice of giving such enormous doses of mercury, but I would like to ask Dr. Morgan, How did you distinguish whether it was mercury, or the disease for which mercury was given?

DR. MORGAN: I learned it from the physician who treated it.

DR. PATTERSON: How did he distinguish it?

DR. MORGAN: I don't know. He assured me that that was the trouble. I had a case where I took out an inch and a half of the inferior maxillary, including one of the temporary teeth and the germs of two permanent teeth, the result of mercurialization, as I was assured by the father. The boy had been taken sick and had been given mercury very freely, and a severe case of salivation was the result. I have seen people yet living whose jaws are ankylosed so that the mouth cannot be opened a particle. In one case a large slough occurred in the cheek, exposing the teeth on the side, which was remedied by a plastic operation. I have seen a great many of those cases. I had a friend die recently to whom was administered within eight hours three hundred and sixty grains of calomel.

Now as to the symptoms. The first symptom is an unusual flow of saliva. Then there is tenderness of the periosteum, the peridental membrane, soreness of the teeth until they sometimes become exceedingly tender and loose. Then there is a tenderness of the gums, and they lose, to a very considerable degree, their density. They are easily cut. A very little pressure will break them at the free margin. I had two cases,—two square, clean-cut cases,—of ptyalism from the hands of a homœopathic friend in the city of Nashville. I appealed to the lady patient, and said, "You have been salivated," and she replied that her doctor had given her ten grains of calomel at a dose. In the other case it was positively denied, but the symptoms were very distinct. There is a peculiar odor. If you have once become a little familiar with it, you can detect it without making an examination of the condition of the mouth.

I am not familiar with all the consequences that follow. In these cases that have come to my hands I have removed the necrosed bone, and I have referred them back to their family physician for treatment. I had an old friend die recently who was salivated many years ago, and the gums never recovered entirely, and a few years

before his death rapid absorption in the alveolar process took place, until all his teeth were very much loosened and almost ready to drop out, and he recognized that it was the sequence of the salivation that had occurred years before. There is a stage in which we have the purple appearance of the gums to which Dr. Barrett alluded, a chronic inflammation in which there is stagnation of the blood, where the blood shows that it is not aërated, and you have the dark, purplish line around the teeth in the gum-tissue.

APPENDIX.

LIST OF DENTAL SOCIETIES IN THE UNITED STATES.

NATIONAL.

American Dental Association. George H. Cushing, *Secretary*, 96 State st., Chicago.

Post-Graduate Dental Association of the United States. Louis Ottofy, *Manager*, Masonic Temple, Chicago.

Dental Protective Association of the United States. J. N. Crouse, *Chairman*, 2231 Prairie ave., Chicago.

Supreme Chapter, Delta Sigma Delta Fraternity. T. A. Broadbent, *Supreme Scribe*, 96 State st., Chicago.

Woman's Dental Association of the United States. Eliza Yerkes, *Secretary*, 4004 Chestnut st., Philadelphia, Pa.

National Association of Dental Examiners. Fred. A. Levy, *Secretary*, Orange, N. J.

National Association of Dental Faculties. J. E. Cravens, *Secretary*, Indianapolis, Ind.

INTER-STATE.

Southern Dental Association. S. W. Foster, *Secretary*, Decatur, Ala.

Mississippi Valley Association of Dental Surgeons. H. C. Matlack, *Secretary*, 126 Garfield place, Cincinnati.

American Academy of Dental Science. George H. Payne, *Corresponding Secretary*, 283 Dartmouth st., Boston.

New England Dental Society. E. O. Kinsman, *Secretary*, 15 Brattle square, Cambridge, Mass.

Southwestern Dental Society. E. P. Morsman, *Secretary*, Oswego, Kansas.

Connecticut Valley Dental Society. George A. Maxfield, *Secretary*, Holyoke, Mass.

Dental Society of the State of Maryland and the District of Columbia. M. W. Foster, *Secretary*, 9 W. Franklin st., Baltimore, Md.

Lake Erie Dental Association. C. D. Elliott, *Secretary*, Franklin, Pa.

STATE AND LOCAL.

ALABAMA.

Alabama State Dental Association. J. H. Allen, *Secretary*, Birmingham.

ALASKA.

None.

ARIZONA.

None.

ARKANSAS.

Arkansas State Dental Society. W. H. Buckley, *Secretary*, Little Rock.

CALIFORNIA.

California State Dental Association. L. Van Orden, *Secretary*, 14 Grant ave., San Francisco.

California State Odontological Society. H. J. Plomteaux, *Secretary*, 1065 Washington st., Oakland.

District Societies.

Southern California Odontological Society. E. L. Townsend, *Secretary*, 133½ S. Spring st., Los Angeles.

Pacific Coast Dental Association. C. E. Post, *Secretary*, 14 Grant ave., San Francisco.

Santa Clara Valley Dental Association. W. B. Kingsberry, *Secretary*, Santa Clara.

City Societies.

San Francisco Dental Association. W. F. Sharp, *Cor. Secretary*, 500 Sutter st., San Francisco.

Los Angeles Dental Society. E. L. Townsend, *Secretary*, Los Angeles.

COLORADO.

Colorado State Dental Association. W. A. Smith, *Secretary*, Salida.

CONNECTICUT.

Connecticut State Dental Association. George L. Parmele, *Secretary*, Hartford.

DELAWARE.

Delaware State Dental Society. R. H. Jones, *Secretary*, 408 Delaware ave., Wilmington.

DISTRICT OF COLUMBIA.

City Society.

Washington City Dental Society. J. R. Walton, *Secretary*, Twelfth, corner G st.

FLORIDA.

Florida State Dental Society. J. C. Perine, *Secretary*, Ocala.

GEORGIA.

Georgia State Dental Society. L. D. Carpenter, *Corresponding Secretary*, 47½ Whitehall st., Atlanta.

IDAHO.

None.

ILLINOIS.

Illinois State Dental Society. Louis Ottofy, *Secretary*, Masonic Temple, Chicago.

District Societies.

Northern Illinois Dental Society. J. W. Cormany, *Secretary*, Mt. Carroll.
Southern Illinois Dental Society. L. B. Torrence, *Secretary*, Chester.
Eastern Illinois Dental Society. Geo. H. Damron, *Secretary*, Arcola.
Western Illinois Dental Society. W. O. Butler, *Secretary*, La Harpe.

City Societies.

Chicago Dental Society. L. L. Davis, *Secretary*, 524 W. Van Buren st.
Chicago Dental Club. E. L. Clifford, *Secretary*, 325 Washington Boulevard.
Odontological Society of Chicago. E. Noyes, *Secretary*, 65 Randolph st.
Odontographic Society of Chicago. U. G. Poyer, *Secretary*, 882 W. Madison st.
Hayden Dental Society of Chicago. Louis Ottofy, *Secretary*, Masonic Temple.
Dental Legal Association. B. J. Cigrand, *Secretary*, cor. North and Milwaukee aves.
The "Atkinsonians." T. A. Broadbent, *Secretary*, 96 State st.
Quincy Dental Society. A. R. Gardner, *Secretary*.

INDIAN TERRITORY.

None.

INDIANA.

Indiana State Dental Association. G. E. Hunt, *Secretary*, Indianapolis.

City Societies.

Odontological Society of Indianapolis.
The Isaac Knapp Dental Coterie of Fort Wayne. W.W. Shryock, *Secretary*.

IOWA.

Iowa State Dental Society. Geo. W. Miller, *Secretary*, Des Moines.

District Society.

Eastern Iowa Dental Association. W. G. Clark, *Secretary*, Cedar Rapids.

KANSAS.

Kansas State Dental Association. C. E. Esterly, *Secretary*, Lawrence.

KENTUCKY.

Kentucky State Dental Association. J. H. Baldwin, *Secretary*, 609 W. Chestnut st., Louisville.

LOUISIANA.

Louisiana State Dental Society. John G. McCulloch, *Corresponding Secretary*, New Orleans.

City Society.

New Orleans Odontological Society. J. Paul Bayon, *Secretary*, 125 Bourbon st.

MAINE.

Maine Dental Society. E. C. Bryant, *Secretary*, Pittsfield.

MARYLAND.

Maryland State Dental Association. W. W. Dunbracco, *Secretary*, 1023 Edmondson ave., Baltimore.

MASSACHUSETTS.

Massachusetts Dental Society. E. O. Kinsman, *Secretary*, 15 Brattle square, Cambridge.

City Societies.

Harvard Odontological Society. Waldo E. Boardman, *Secretary*, 184 Boylston st., Boston.

Boston Society for Dental Improvement.

Worcester Dental Society.

MICHIGAN.

Michigan State Dental Association. J. Ward House, *Secretary*, Grand Rapids.

City Societies.

Detroit Dental Society. H. C. Raymond, *Secretary.*

Grand Rapids Dental Society. J. Ward House, *Secretary.*

MINNESOTA.

Minnesota State Dental Association. L. D. Leonard, *Secretary*, 251 Nicollet ave., Minneapolis.

District Society.

Southern Minnesota Dental Society. W. D. James, *Secretary*, Tracy.

City Societies.

Minneapolis Dental Society. E. F. Clark, *Secretary.*

St. Paul Dental Society. Chas. A. Van Duzee, *Secretary.*

MISSISSIPPI.

Mississippi State Dental Association. W. E. Walker, *Secretary*, Bay St. Louis.

MISSOURI.

Missouri State Dental Association. H. A. Ruby, *Secretary*, Clinton.

City Societies.

St. Louis Dental Society. J. B. Vernon, *Secretary.*
Kansas City Dental Club. R. R. Buchanan, *Secretary.*
St. Joseph Dental Society. H. D. Atkinson, *Secretary.*

MONTANA.

None.

NEBRASKA.

Nebraska State Dental Society. D. P. Simms, *Corresponding Secretary*, Lincoln.

City Society.

Odontological Society of Omaha. Geo. S. Nason, *Secretary.*

NEVADA.

None.

NEW HAMPSHIRE.

New Hampshire Dental Society. Edward B. Davis, *Secretary*, Concord.

NEW JERSEY.

New Jersey State Dental Society. Charles A. Meeker, *Secretary*, 29 Fulton st., Newark.

District Society.

Central Dental Association of Northern New Jersey. S. S. Hawley, *Secretary*, Newark.

NEW MEXICO.

None.

NEW YORK.

Dental Society of the State of New York. Charles S. Butler, *Secretary*, 680 Main st., Buffalo.

District Societies.

First District Dental Society. B. C. Nash, *Secretary*, 113 W. Seventy-eighth st., New York city.

Second District Dental Society. John J. Pitts, *Secretary*, Clinton and Atlantic, Brooklyn.

Third District Dental Society. F. Le Grand Ames, *Secretary*, 63 Washington ave., Albany.

Fourth District Dental Society. A. C. Rich, *Secretary*, Saratoga Springs.

Fifth District Dental Society. A. A. Stillman, *Secretary*, 15 E. Jefferson st., Syracuse.

Sixth District Dental Society. T. B. Fuller, *Secretary*, Binghamton.

Seventh District Dental Society. Chas. T. Howard, *Secretary*, 522 Powers Building, Rochester.

Eighth District Dental Society. W. A. Barrows, *Secretary*, 39 Court st., Buffalo.

City Societies.

New York Odontological Society. S. F. Howland, *Secretary*, New York city.

Brooklyn Dental Society. Lewis Shaw, *Secretary.*

Stomatological Club of Buffalo.

NORTH CAROLINA.

North Carolina State Dental Association. J. E. Wyche, *Secretary*, Oxford.

NORTH DAKOTA.

North Dakota State Dental Society. R. B. Foster, *Secretary*, Grand Forks.

OHIO.

Ohio State Dental Society. L. P. Bethel, *Secretary*, Kent.

District Societies.

Northern Ohio Dental Association. L. P. Bethel, *Secretary*, Kent.

Ohio Valley Dental Association. F. S. Maxwell, *Secretary*, Steubenville.

City Societies.

Odontological Society of Cincinnati. W. M. Williams, *Secretary*, 141 Garfield place.

Cleveland Dental Society. R. A. Dinsmore, *Secretary*, 8 Euclid ave.

OKLAHOMA.

Oklahoma Dental Association. Laura Davis, *Secretary*, Oklahoma City.

OREGON.

Oregon State Dental Society. L. E. Hibbard, *Secretary*, Portland.

PENNSYLVANIA.

Pennsylvania State Dental Society. C. V. Kratzer, *Corresponding Secretary*, Reading.

Odontological Society of Pennsylvania. A. W. Deane, *Secretary*, 1228 Walnut st., Philadelphia.

Pennsylvania Association of Dental Surgeons. Theodore F. Chupein, *Secretary*, 1408 Pine st., Philadelphia.

District Societies.

Susquehanna Dental Association. V. S. Jones, *Secretary*, Bethlehem.

Lebanon Valley Dental Association. J. H. Herbine, *Corresponding Secretary*, Pottsville.

County Society.

Philadelphia County Dental Society. Chas. E. Graves, *Secretary*, 715 N. Forty-first st., Philadelphia.

City Societies.

Philadelphia Dental Club. D. N. McQuillen, *Secretary*, 1628 Chestnut st.
Pittsburg Dental Society. H. L. Reinecke, *Secretary*, 1813 Carson st.
Odontological Society of Pittsburg. W. H. Fundenburg, 958 Penn ave.

RHODE ISLAND.

Rhode Island Dental Society. W. H. Carpenter, *Secretary*, Providence.

SOUTH CAROLINA.

South Carolina State Dental Association. B. Rutledge, *Secretary*, Florence.

SOUTH DAKOTA.

South Dakota State Dental Society. F. O. Sale, *Secretary*, Huron.

TENNESSEE.

Tennessee Dental Association. P. D. Houston, *Secretary*, Lewisburg.

District Society.

East Tennessee Dental Association.

TEXAS.

Texas State Dental Association. Chas. B. Lewis, *Secretary*, Ennis.

UTAH.

Utah Dental Association. W. H. Bucher, *Corresponding Secretary*, Salt Lake City.

VERMONT.

Vermont State Dental Society. Thos. E. Mound, *Secretary*, Rutland.

VIRGINIA.

Virginia State Dental Association. Geo. F. Keesee, *Secretary*, Richmond.

WASHINGTON.

Washington State Dental Society. F. P. Hicks, *Secretary*, Tacoma.

City Societies.

Seattle Dental Society. J. C. Grasse, *President*, Seattle.
Tacoma Dental Society. A. McCulley, *Secretary*, Tacoma.

WEST VIRGINIA.

West Virginia State Dental Society. Geo. I. Keener, *Secretary*, Morgantown.

WISCONSIN.

Wisconsin State Dental Society. Claude A. Southwell, *Secretary*, 411 National ave., Milwaukee.

WYOMING.

None.

SUMMARY.

National	7
Inter-State	8
State and Territorial	45
District and Local	24
City	35
Total	119

The above list is compiled and published by Section II of the American Dental Association. All dental societies having a membership of five or more, and which have adopted substantially the same Code of Ethics governing the conduct of members of the American Dental Association, are entitled to send one delegate for every five members of their society.

The list of societies is as correct and complete as it was possible to make it. Secretaries of societies should make it a rule to notify the Secretary of the American Dental Association (Dr. Geo. H. Cushing, 96 State st., Chicago) of changes in the list of officers, time of meeting, etc.

Anyone will confer a favor by notifying either of the undersigned of any errors or omissions.

LOUIS OTTOFY,
Chairman,
Masonic Temple, Chicago.

Or C. N. PEIRCE,
Secretary Section II, A. D. A.,
1415 Walnut st., Philadelphia.

STANDING RESOLUTIONS.

The following standing resolutions are in force at this time, August, 1893:

Resolved, That henceforth no person shall be received as a delegate who is in arrears for dues, or until he has paid to the Treasurer the full amount due at the time his name was dropped for non-payment.

Adopted 1874.

Resolved, That hereafter no dental college shall be entitled to representation in this Association that does not require a good English education as a preliminary qualification for its matriculants, to be ascertained by examination.

Adopted 1879.

Resolved, That in order to secure representation in this Association, dental colleges must, subsequent to October, 1881, require all students entering therein to take two full courses of lectures previous to coming forward for examination and graduation, and must also state these conditions in their next annual announcement.

Adopted 1880.

Resolved, That hereafter no society shall be entitled to representation in this Association that does not require its members to live up to the requirements of our Code of Ethics.

Resolved, When it comes to the knowledge of the Committee on Credentials that any applicant for membership is violating our Code, said applicant shall not be received, and all such applicants shall be referred by the Committee to the societies whose delegates they are, and in no case shall this Association be compelled to treat with violations of the Code, except where the violator is a member of this body and has no membership in any local society.

Adopted 1881.

Resolved, That the Secretary be instructed to assign members, who may neglect to make their own choice, the Section in which they are expected to work.

Adopted 1879.

Resolved, That the reports of Sections shall be called by the President in consecutive order, beginning each succeeding year one number higher than on the preceding year.

1879	commencing	with	No. I.	1887	commencing	with	No. II.
1880	"	"	No. II.	1888	"	"	No. III.
1881	"	"	No. III.	1889	"	"	No. IV.
1882	"	"	No. IV.	1890	"	"	No. V.
1883	"	"	No. V.	1891	"	"	No. VI.
1884	"	"	No. VI.	1892	"	"	No. VII.
1885	"	"	No. VII.	1893	"	"	No. I.
1886	"	"	No. I.	1894	"	"	No. II.

Adopted 1879.

Resolved, That a paper presented to the Committee on Voluntary Essays and by them considered and returned to the writer with notification that the said paper is not accepted, cannot afterward be read before the Association unless it is made the special order by resolution adopted.

Adopted 1885.

It shall be the duty of the Executive Committee of the Association to provide at the opening of each annual meeting a book for the registration of members or visitors as they arrive, which shall also give place of residence and hotel where each may be found.

Adopted 1886.

Resolved, That in the future this Association discountenance the giving of banquets, excursions, entertainments, etc., by local professional societies or individuals, either during or at the close of our annual meetings.

Adopted 1886.

Resolved, That it shall be the duty of the Chairman of the Credentials Committee to procure and keep a book wherein each delegate who wishes to be considered a permanent member of this Association shall enter his name.

Adopted 1886.

Resolved, That it is unprofessional to use on cards or signs anything except name, title, and address.

Adopted 1888.

Resolved, That any member of the dental profession who has been in reputable practice for a period of fifty years may be elected to permanent membership in this Association without the payment of dues; and any member of this Association who has been in practice for a like period shall have his dues remitted thereafter by presenting the fact to the Treasurer of the Association.

Adopted 1889.

WHEREAS, The National Association of Dental Faculties has passed a resolution adopting a three years' course of instruction after matriculation as essential to graduation; therefore

Resolved, That in the future no dental college shall be represented in this Association that does not comply with the course of instruction adopted by the college association named.

Adopted 1889.

Resolved, That this Association now in session direct that Sections belonging thereto shall in the future be prohibited from inviting individuals who are violating the Code of Ethics to hold clinics or to give other exhibitions before this body.

Adopted 1891.

Resolved, That a permanent Standing Committee on Necrology be appointed, to consist of five members, whose duty it shall be to act, without further instruction from this body, as occasion may require, and report to the annual meeting of the Association.

Adopted 1891.

WHEREAS, Section I has been unable in recent years to obtain sufficient matter to make a proper report; and

WHEREAS, It is the opinion of the Section that it is properly entitled to papers on crown-work, bridge-work, and orthodontia; therefore, be it

Resolved, That hereafter all papers on these subjects shall be submitted to Section I.

Adopted 1892.

Resolved, That a Standing Committee, to be styled the "Committee on State and Local Organizations," and composed of three members, shall be appointed, originally for terms of one, two, and three years respectively, and that all vacancies due to expiration of term shall thereafter be filled for terms of three years. All vacancies occurring from any other cause shall be filled for the unexpired term.

The basis of the plan and scope of work of said Committee, and its duties in relation thereto, shall be the suggestions as set forth in the address of the President of the American Dental Association for the year 1892; also the articles from which he quotes, and in harmony with the circular letters issued by the Chairman of the Executive Committee.

Adopted 1892.

1 gal

233

3 2044 10

102 980 323